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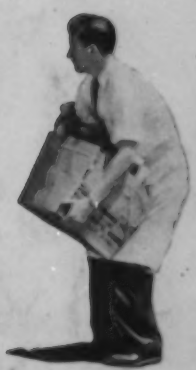

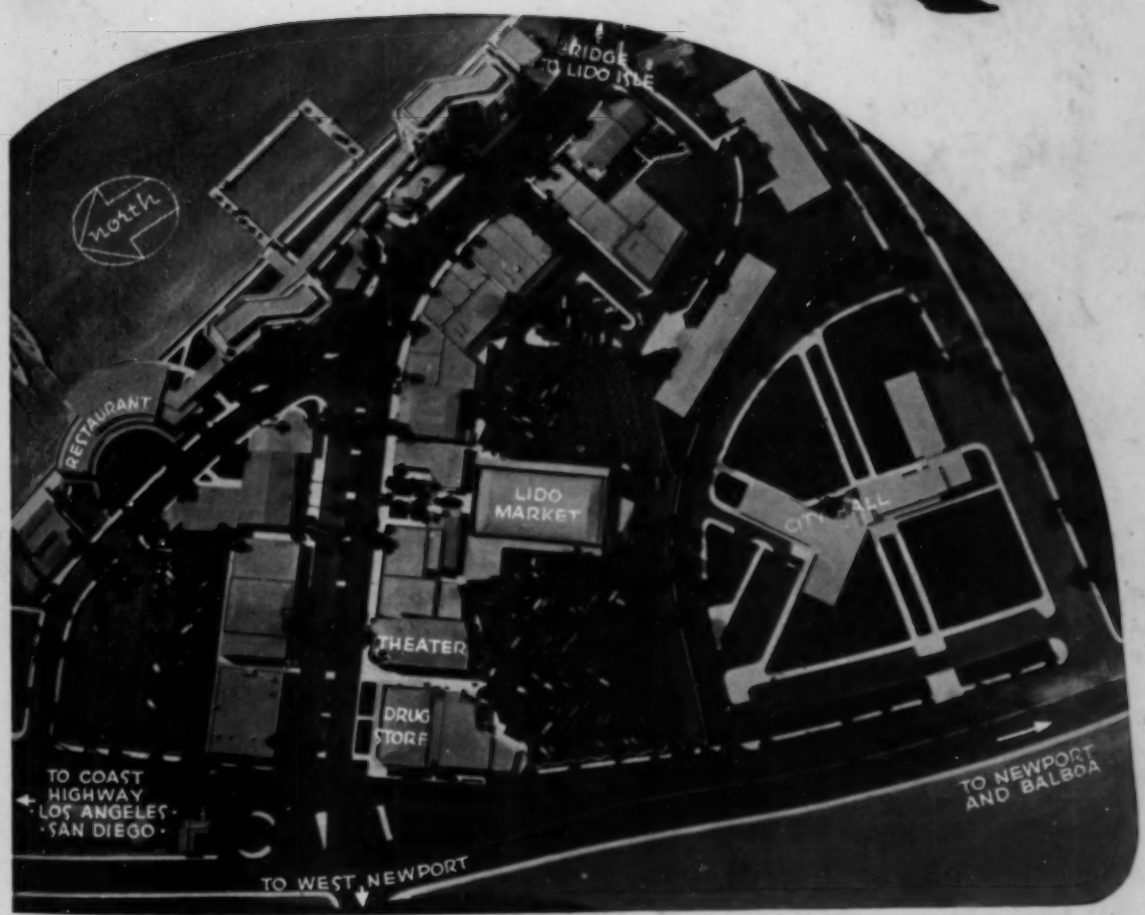

AUGUST 1949

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ARCHITECTURAL

RECORD

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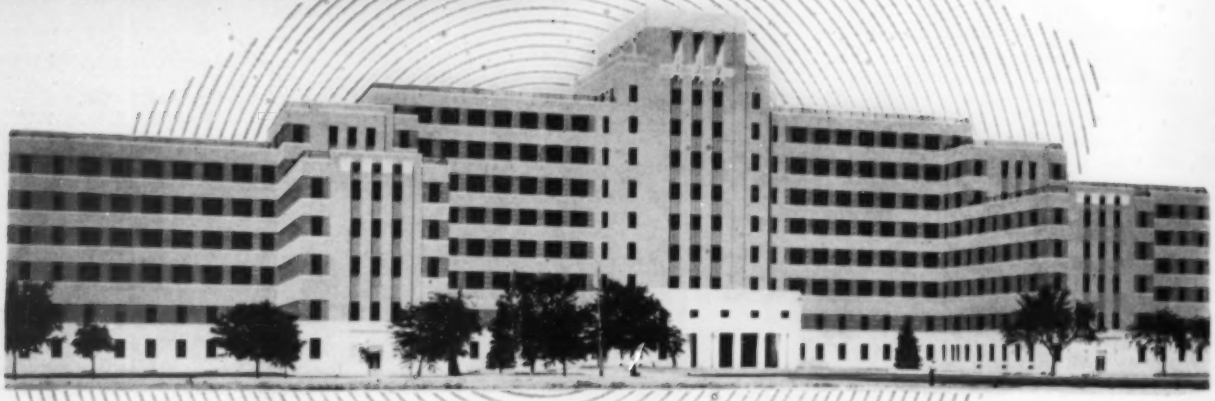

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THE RECORD REPORTS

HHFA Organizes for Action, Outlines Research Program Established under New Housing Law; Funds for School Construction under Debate

Just one month ago the long fight over a broad new federal housing program came to an end when the House of Representatives finally passed the Administration measure on a vote of 228 to 185. Subsequent conference committee adjustments brought the bill into line with the Senate's version on important counts and a new law called for construction of 810,000 public housing units in six years. In addition, a new housing policy was established, a $1.5 billion slum clearance program approved, extensive research on materials and methods of construction was authorized, and a $262,500,000 farm housing plan was established.

Thus the arguments of past years over more substantial federal aids for housing passed into limbo and attention centered on carrying out provisions of the new act. The Housing and Home Finance Agency, charged with the responsibility of putting the law into practice, stepped up its planning in anticipation of implementing funds. Preparations could be made but certain important organizing actions could not be taken until the money was made available. A fund to start the big program rolling would be asked for at once and Administrator Raymond M. Foley expected "a significant number" of low-rent public housing units to be started across the country within a year.

HHFA has had experience with public housing administration. It is a natural and easy thing to expand the activities of the Public Housing Administration to handle those features. But the prospect of a national slum clearance effort and other aspects of the Housing Act of 1949 posed fresh problems. The new approach to federal aids for solving the complex postwar shelter difficulties offered an immediate challenge to Foley's agency. That agency is charged with detailed administration of all phases of the law except farm housing, which falls largely to the Agriculture Department.

The nation's business interests, along with home seekers, were asking the obvious question — "What now?"

Attention of architects and engineers quickly settled on projected new research activities, Title III. Wording of this part gives HHFA extensive leeway in expanding present research programs and developing new ones. It contains some of the least specific sections in the bill. For example, no money amounts are listed in Title III. Best estimates, however, place at from $4 million to $5 million the annual cost of research when the program gets into full swing.

Again, the rapidity with which these steps are taken depends on the whims of Congress in appropriating cash. In this connection it was noted that in final balloting 21 members of the House Committee on Appropriations voted against the measure while 20 voted for it. In an earlier vote on the Rees amendment, which would have deleted all public housing from H.R. 4009, 23 members of the Appropriations group supported the amendment, only 19 voting against it.

What's Ahead for Research?

It is believed the final HHFA approach to housing research will evolve on two broad levels. First, data will be made available to industry — data aimed at assisting in production of a higher volume of good homes at lower cost to the buyer or renter. This will involve new techniques in distribution, financing and sales as well as in design and assembly of materials. Second, through the new legal prerogatives the Federal Housing Administrator is in a position for the first time to gather comprehensive data on the national housing inventory and national housing requirements. Survey results will provide him with a blueprint for establishing the direction that broadened federal housing activities are to take. For this reason it is logical that the primary effort will be concentrated on the survey work. It certainly will be one of HHFA's first areas of attack.

Contemplated full development of the research program will be a new thing in America. True, there have been several projects undertaken and carried through to fairly exhaustive conclusion by the agency. These studies range from the intricacies of house nailing to complex vapor barrier behaviors. But all that has been done up to this point, important as it is, will be tenuous indeed in comparison with the activity expected to start within the next year as authorized in the new legislation.

The law specifies another office for HHFA, a Director of Research. This will be established directly under the juris-

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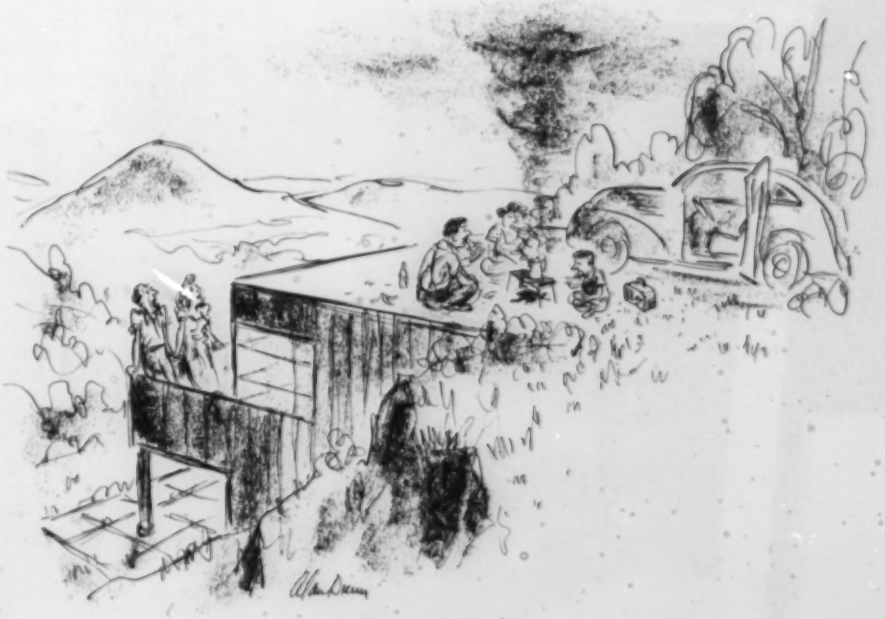

"Hey, what's going on up there!"

— Drawn for the RECORD *by Alan Dunn*

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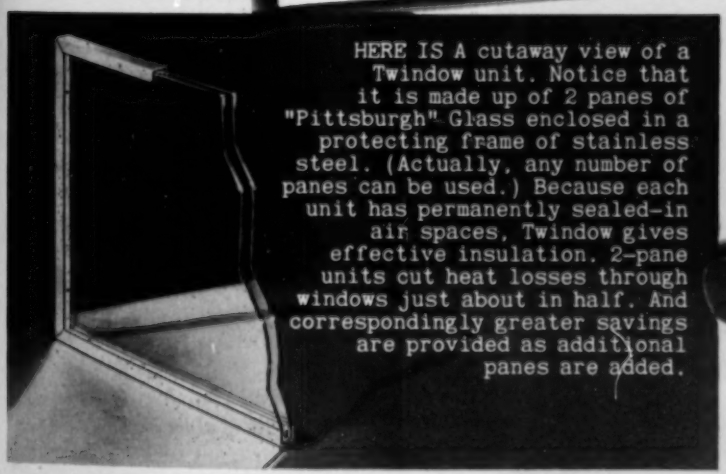

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THE RECORD REPORTS

(*Continued from page 7*)

diction of the Administrator. A new Division of Research, embracing the old functions of the Division of Standardized Building Codes and Materials, was contemplated at this writing.

Beyond these developments, the details of organization were not so certain. The National Housing Council, including the Administrator, heads of the three constituent agencies and representatives from other government agencies with an interest in housing, has a firm hand in detailing final operative procedures.

It was learned that a tentative plan drawn up within HHFA as enactment of the law was assured, called for creation of four branches under the Director: (1) economics and statistics; (2) codes and regulations; (3) design and construction standards; and (4) test procedures and specifications. These four branches would administer in nine major areas of housing research:

1. Production and distribution — survey of the industry.
2. Inventory and improvement of statistics.
3. Cost data and analysis.
4. Housing market analysis.
5. Housing credit and finance.
6. Building codes and other regulations.
7. Construction practices.
8. Residential design standards including emphasis on modular coordination and new materials and equipment.
9. Test procedures and investigations.

The above might well form the foundation of research operations over the years ahead, but, as stated, any early blueprint of administrative methods must be considered a tentative, elastic plan subject to the judgment of executives as the working procedure develops.

Foley Tells Aims

In the Normandy Building headquarters in Washington a staff of 150 has been burning the midnight oil rough-drafting plans for operation under the housing act. Administrator Foley has outlined one formula that is basic to all the new operations: progressively higher volume and lower unit costs. This formula has worked too successfully in too many other American industries for it not to work in home building, he believes.

He states that as the production operation is examined, his agency will undertake design studies to find out if less elaborate and less costly elements of home assembly can be devised.

Examples of what can be done in this direction lie in studies of roof design (ARCHITECTURAL RECORD, May, 1948) and septic tank construction made under earlier but very much limited programs.

In addition to this "hard" technical research, Foley's agency will plumb housing market operations. He is setting out to help industry learn more about size of local markets, how they fluctuate from time to time and the relationships between family income and active market demand. And one especially glaring need, says Foley, is for expansion of knowledge of the housing market in connection with housing problems of minority groups.

On market analysis, Foley holds that the community itself should be the informed source on its own housing problems. There lies the prime responsibility

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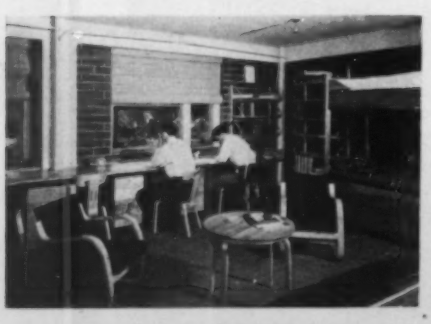

Above, view of the north side of the New Dormitory reveals cantilevered stairways and increasing lounge space on upper floors. Below, left, students' room; right, main lobby desk

NEW M.I.T. DORMITORY

The New Dormitory, Alvar Aalto's highly original response to M.I.T.'s call for expanded student living quarters, has been officially opened for occupancy beginning with the current summer session. Of serpentine shape, the building, which was first published in the RECORD (December 1947, pages 97–99), provides a variety of room sizes and shapes and an absence of any north-facing quarters; most rooms receive direct sunlight every day and nearly all face upon the Charles River.

The dormitory, which is designed to house 353 students, stands on a site 125 by 332 ft. long, and contains 247 residence rooms: triples, doubles and singles and a master's apartment with separate entrance. The north side has been reserved for lounges and corridors.

All furnishings in the New Dormitory were designed by Mr. and Mrs. Aalto and are of light blond hardwood which contrasts with the red tile of the interior walls. For the exterior surface of the building Mr. Aalto selected hand-made brick from northern New England. The dining extension on the Charles River side of the structure is finished in contrasting stone.

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THE RECORD REPORTS

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for developing sound and well-organized data on local needs and local markets. He said the experience gained by the federal government through its underwriting experience in the Federal Housing Administration and through its war housing programming activities under the wartime National Housing Agency will be passed on to the local communities through technical bulletins, demonstrations and advisory assistance.

Statistical Gaps Still Exist

The agency will not attempt to tackle these problems alone. It doesn't want to, and if it did, the language of the Act forbids it. The law specifies that research facilities of other government agencies, and private groups, shall be coordinated. When the bill was finally put through Congress, Foley issued a statement which said in part:

"In the research program the Agency sees an almost unlimited opportunity to develop close cooperation between government and private enterprise and thereby increase the range of housing that private industry can supply. In this endeavor, our plans call for close consultation through advisory committees representing industry, local governments, labor, consumer interests, and other federal agencies to formulate and carry out details of a progressive program."

How can an extensive research program assist in stabilizing employment and the total economy?

Said Foley: "One of the important results that can come, and we believe will come, from the type of research program here proposed, is the development of the necessary data and information out of which a long-range program can be developed by industry and government together so as to avoid these very wide fluctuations to a large extent."

Utilities to Expand

Privately owned utilities (particularly the electric companies) have decided to go ahead with their big postwar improvement plans. One instance is the National Association of Electric Companies. Firms in this organization are expanding their investors' funds at the rate of over $5 million a day for new power plants, transmission lines, distribution systems and other facilities. They will invest over

(*Continued on page 14*)

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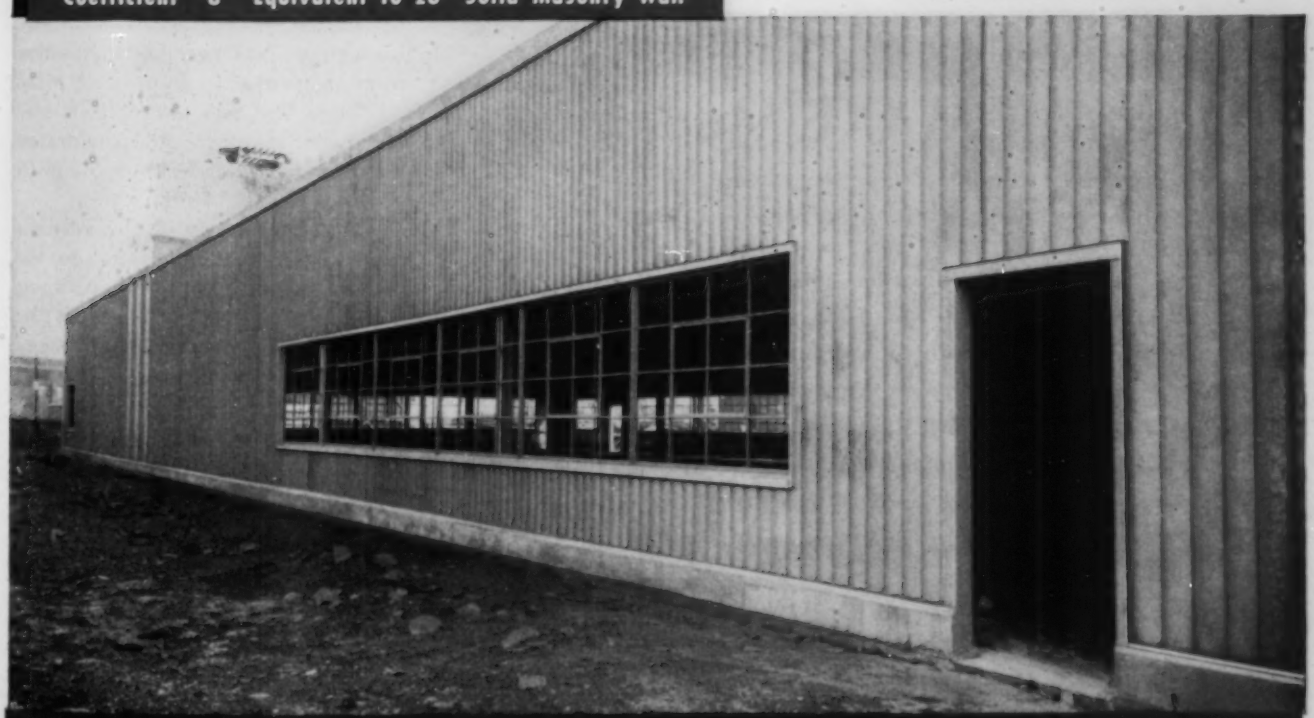

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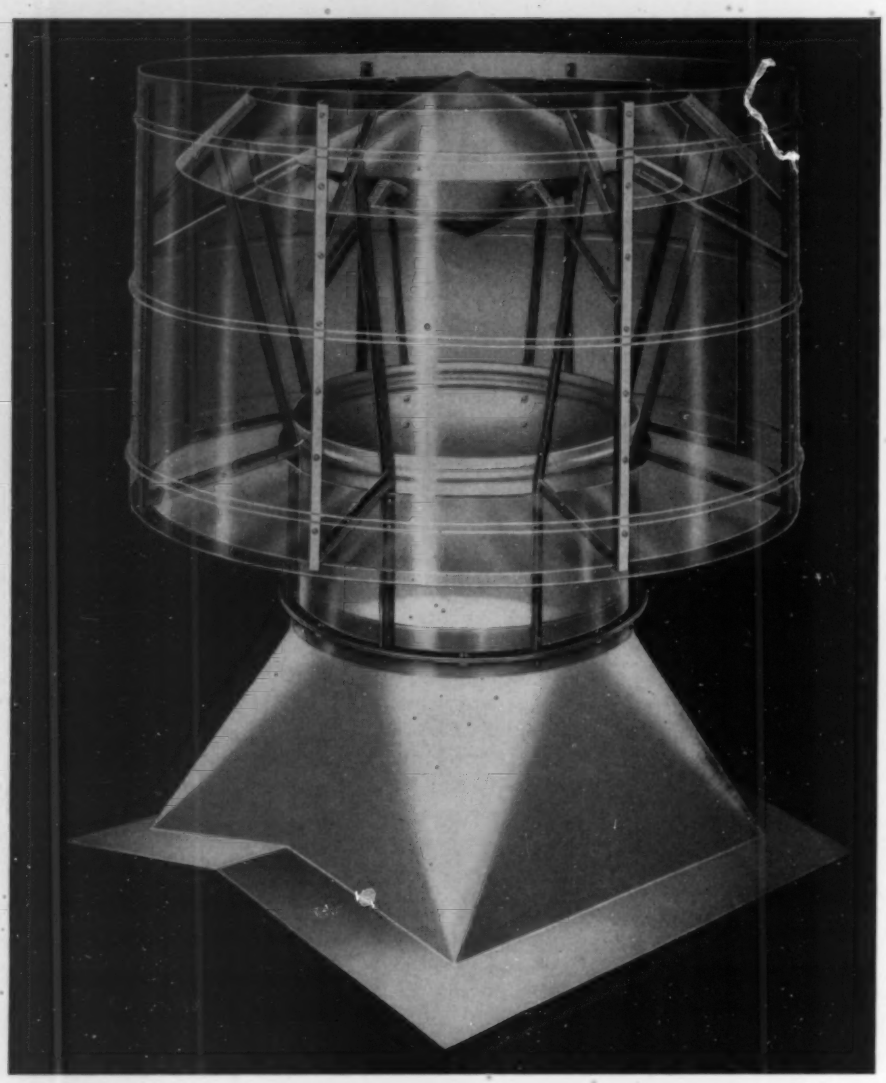

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(*Continued from page 12*)

$2 billion in new property and plant this year. Their immediate postwar construction program, ending in 1951 involves outlay of more than $9 billion. The expansion will increase power production capacity by 52 per cent compared with the total on V-J Day.

Increased Public Works

Public construction, financed by state and local governments, also will swell the 1949 volume. All types of public work, except military and naval, are expected to soar, reaching a dollar figure of $5175 million, 23 per cent above 1948 estimates. Hospital and school construction will account for nearly half the increase.

The economists have not changed their views on residential building this year, however. Private nonfarm homebuilding, say the experts, will remain at the $6500 million level anticipated in earlier forecasts; 10 per cent under last year's dollar volume but well over that for the postwar years 1946 and 1947.

From Inflation to Deflation

Though the best information in Washington has construction headed for a new high, the general attitude on Capitol Hill has made a significant switch this summer. No longer do Congressmen worry about what to do to check inflation forces. But they always have their worries and now these are concentrated on what to do about deflation — how to economize on fiscal 1950 budgets.

The Administration's anti-inflation program which raised fears in the minds of conservative Republicans seven months ago, is referred to now as the great forgotten issue of the first session. It is likely that changing economic conditions have relegated this Spence bill to the dead files for good, that justification for it will have disappeared entirely by the time the second session convenes.

What will take its place? Interest already has shifted to the Economic Expansion Act proposed by Sen. James E. Murray, who did not have to look very hard for co-sponsors. Aimed at providing economic stability, firm growth and expansion of business, this could herald the introduction of a fairly good-sized pump priming endeavor, a plan complete with large public works programs. Business and government would join hands under the Murray proposals to

(*Continued on page 16*)

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(*Continued from page 14*)

lift up production and build new plant facilities at the same time. Involved are incentive loans by Uncle Sam and the possibility of outright government construction of plant capacity.

Almost certainly there will be a revival of the advance planning program — in some form. Bills were introduced throughout the first session calling for revival of the Bureau of Community Facilities plan of interest-free loans to states and local governments to be used for planning public works. With unemployment increasing, economic reasons for calling back the BCF program were near at hand.

Though the Bureau had changed its location from the Federal Works Agency to the new General Services Administration, its status remained intact. Passage of the first major reorganization bill since the Hoover Commission made its voluminous reports erased the Federal Works Agency as such and placed BCF, the Public Roads Administration, and Public Buildings into combination with the Bureau of Federal Supply, the liquidating War Assets Administration and Archives. Jess Larson, former WAA head, was promptly named chief of the new GSA.

Attention on Schools

Federal financial aid for public school construction had progressed through subcommittee hearings and sponsors were more hopeful of enactment if Congress remained in session long enough. A crowded schedule approaching proportions of a true legislative log-jam made consideration doubtful, however, before next year. In any event, the groundwork for the bill has been established.

Evidence shown the Senate Labor and Public Welfare subcommittee placed at $8280 million the primary and secondary school plant needs in the next six years. This is for 44 states and the District of Columbia. U. S. Office of Education said no comparable reports were on hand for Arizona, Illinois, Massachusetts and Montana.

Minnesota's Sen. Hubert H. Humphreys commented: "A conservative average of the statistics and estimates leads to the conclusion that public elementary and secondary school construction of a total value of $1 billion each year for the next 10 years will

(*Continued on page 18*)

Do you know that AVA CABLES can deliver up to 49% extra current per raceway?*

Yes, wherever sizable electrical loads are carried in dry locations,† you may find substantial installation savings in General Electric Deltabeston® AVA cables.

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To you, Deltabeston AVA cables mean *installation speed*, because they can help on many jobs by cutting the number of cables you put in—*material savings*, because AVA cables can deliver extra current per raceway—*weight savings*, because small size means light weight.

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† *As defined by the National Electrical Code.*

* The figure above was worked out for AVA cables at 1000 MCM. Larger and smaller sizes give similar savings.

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THE RECORD REPORTS

(*Continued from page 16*)

barely meet the minimum requirements."

Shorts

• As supplies of building materials continued to improve, the Office of International Trade narrowed still further its restrictions on some items used by builders. Latest affected was aluminum. Export quotas were removed entirely for the balance of the year 1949. This cancelled an earlier OIT announcement that third-quarter quotas for exporting aluminum plate, sheet and strip would be 15,000 short tons. Announced reason for abandoning aluminum export quotas is one growing more and more familiar to industry — "because of recent general improvement in the domestic supply situation."

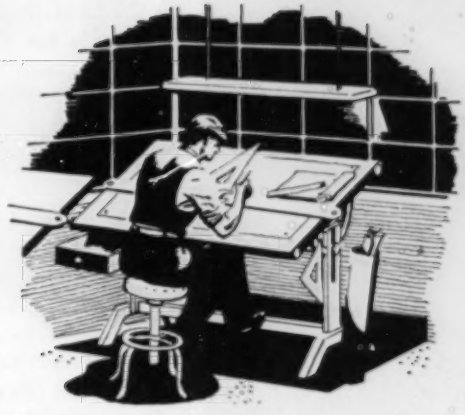
• It began to appear that "clarification" of industry's pricing methods would come through exemption from antitrust law prosecution rather than through a moratorium or complete revision of statutes. The Senate already had handled the problem in this simpler fashion. It passed a measure modifying the Federal Trade Commission Act and the Clayton Act. This would permit sellers to use the basing point individually and to absorb freight charges wherever no collusion or monopoly was involved. The House was ready to consider a favorable report from its own judiciary committee, brought out over the vehement protests of Rep. Wright Patman of Texas, extreme foe of basing point practices.

• A trend toward establishment of more large valley authorities was evident. Public works committees pushed their efforts on bills creating a Columbia Valley Administration to coordinate the large construction functions now shared separately by Army Corps of Engineers, the Bureau of Reclamation, and the Bonneville Power Administration. Interior Secretary Krug said confusion exists as to which agency will do certain parts of the work. He urged a new CVA to coordinate functions of all.

• A National Labor Relations Board ruling threatened to upset the long-standing referral and hiring arrangement in the building trades. The Board said it violated Taft-Hartley's closed shop ban. It was the first word from the NLRB on legality of hiring practices in building

(*Continued on page 20*)

demand DETROIT CERTIFIED CONTROLS



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"Detroit" Ideal Fast Venting Systems—For automatic low pressure one pipe steam systems. The No. 300 Adjustable Multiport Valve for radiators enables you to speed slow heating radiators—get heat quicker from all radiators simultaneously. No. 861 Hurivent for mains provides full ½" diameter port. Will vent 130 feet of 2" main in 30 seconds at only 4 ounces pressure. This system saves fuel, improves comfort and speeds up sluggish one pipe jobs. Write for Bulletin No. 166.

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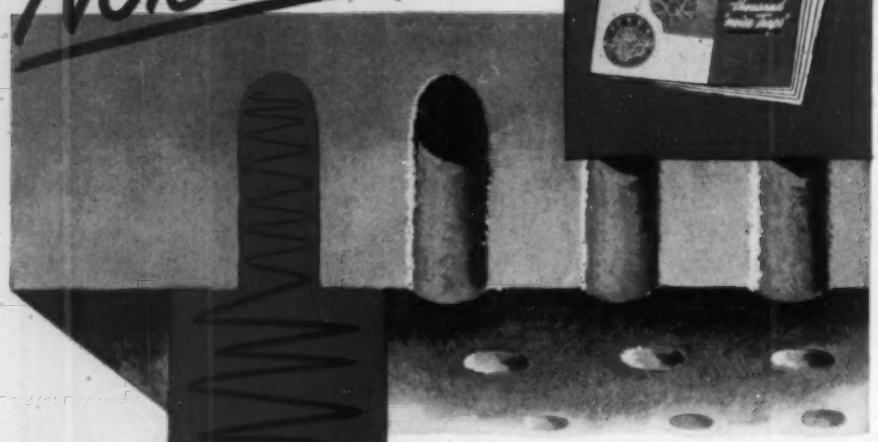

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• In this new brochure, you can read in *non-technical* language how noise-control brings *quiet* to your office, restaurant, bank, store, school, factory, or recreation center.

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Once you experience the benefits of Fibretone, you'll never be satisfied with an ordinary, noise-reflecting ceiling.

Send for this new Fibretone brochure . . . and see for yourself how it shows the way to a more comfortable environment, less nerve strain, increased production! Write Johns-Manville, Box 290, Dept. AR-8, New York 16, New York.

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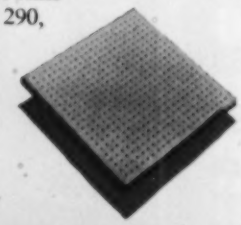

Put a ceiling on noise with

JOHNS MANVILLE PRODUCTS JM Johns-Manville FIBRETONE

THE RECORD REPORTS

(*Continued from page 18*)

and construction under the T-H law. And from Senate action late in June it appeared T-H would be changed in no major respects this year.

• Congress finally enacted the Public Buildings Act of 1949, now Public Law 105. But until implementing funds are voted, the Public Buildings commissioner can do little toward carrying out its provisions aside from making new administrative arrangements. The Act looks forward to the eventual construction of at least one federal building in each congressional district of the country. Selection of projects is left to the Federal Works Administrator (now the General Services Administrator) and, where post offices are concerned, to the Postmaster General. One qualification is imposed on the selecting process — the projects must be distributed equitably throughout the country with due regard for comparative urgency. The law sets up a fund of $40 million for comprehensive planning of federal public buildings and for site acquisition. An additional $30 million is authorized for improving existing federal structures. Anticipating the need for more small post office designs, PBA ran a contest for its employees in the design of "one-man" type post offices. Winning designs will be produced in working drawings as types and will be named after their designers.

• Surveys by Department of Commerce and Securities and Exchange Commission showed that American business (agriculture excluded) plans to spend $4.6 billion on new plant and equipment in the third quarter, 1949. This is 4 per cent under the second quarter estimated outlay, also 4 per cent under third quarter figures for 1948. Not quite 30 per cent of total expenditures on plant and equipment during the first half of 1949 was for new construction. This was a somewhat smaller proportion than in 1948.

• Associated General Contractors of America and the American Association of State Highway Officials jointly report that road construction costs dropped appreciably during the early summer, that labor productivity has climbed considerably in recent months, and that all materials are much more readily available. Bidding competition on highway work has become much more lively.

(*Continued on page 22*)

NOW AVAILABLE FOR ROOFS ON NEW CONSTRUCTION

CONDUCTORS
Spouting
Gutters
Valleys

WEATHER-SEALING
Flashings
Ridges
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Follansbee Seamless Terne Roll Roofing

20-lb. Coating Weight • 50-ft. Continuous Rolls

Follansbee Seamless Terne Roll Roofing, in the popular 50-foot continuous roll, may now be applied on new construction as well as for maintenance and replacement. Government Regulations on the utility-weight 20-lb. coated Follansbee Seamless Terne Roll Roofing have been relaxed.

You can use Follansbee Seamless Terne Roll Roofing on your next roofing contract. 50-foot rolls in 20-lb. coating are now available thru leading distributors.

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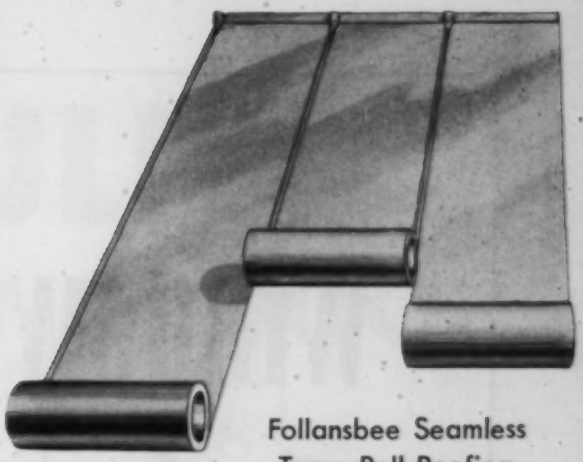
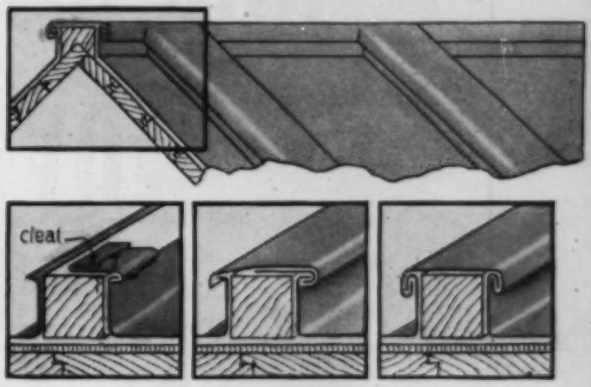
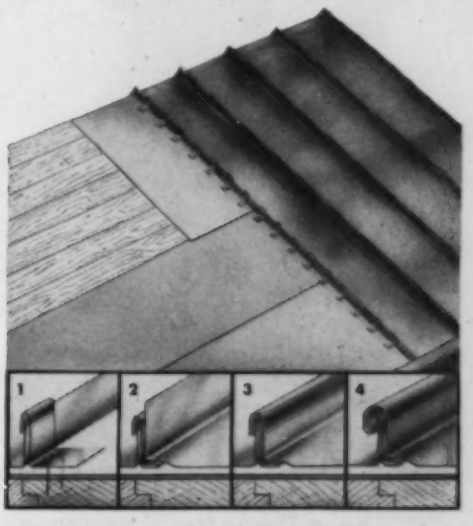


Follansbee Seamless Terne Roll Roofing

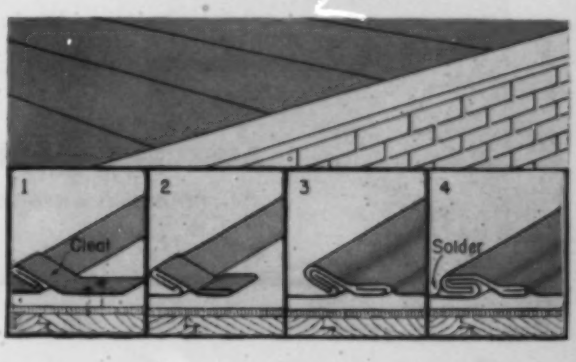
Used in Batten Roof Design



Standing Seam Construction Detail



Flat Seam Installation



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THE RECORD REPORTS

(*Continued from page 20*)

• A drive was launched in the Senate Appropriations subcommittee handling the Independent Offices appropriations bill for fiscal 1950 to clip the spending powers of the Atomic Energy Commission relative to its construction projects. A limitation voted by the subcommittee would apply to all building projects of the Commission costing more than $500,000. The restriction was aimed at holding down overruns on jobs that skyrocket in cost beyond original estimates. Basis for the move could be traced to the much-publicized hearings on mismanagement charges brought against the AEC by Sen. B. B. Hickenlooper of Iowa. These hearings highlighted excessive overruns in AEC town projects. The proposed spending brake would deny use of AEC funds for:

1. Starting any new construction not included in its budget for the current fiscal year.

2. Beginning any new project on which cost estimates have grown beyond the figure in the Commission's budget for the current fiscal year.

3. Continuing any such project unless the Budget Bureau specifically approves and gives the appropriation committees of Congress detailed explanation.

• The Federal Reserve Board judged on the basis of surveys conducted the first of the year that somewhat over one million consumer spending units were expecting to buy new houses in 1949. By current estimates that figure was greater than the number of new units to be completed for owner-occupancy this year. Survey results suggested that low and middle income spending units were in the market for more moderate-priced houses of acceptable quality than seem likely to be produced. The Board drew this general conclusion: "There were indications that some buyers would wait for price declines which they expected to occur. Further, from consumer attitudes on the economic outlook, uncertainty as to jobs and income may be another important undercurrent influencing buyer behavior. However, unless consumer attitudes and incomes have changed materially since the beginning of the year, or should change significantly in the coming months, the year's prospects for consumer purchases of durable goods and houses are by no means discouraging."

(*News continued on page 158*)

NEW! INSULITE INSULATING WOOL

MADE OF
FIBERGLAS
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MANUFACTURED BY
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High quality construction at a low price—that's what prospective home owners are demanding. And when it comes to flexible insulation, **INSULITE** Insulating Wool is made to order to meet just such demands. Here, then, is a permanent, highly efficient insulation—competitively priced!

LOOK AT ALL THESE ADVANTAGES

Made of fine fibers of glass, forming millions of tiny air pockets, it is a highly efficient barrier to the flow of heat.

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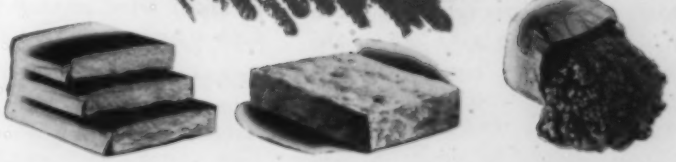
INSULITE Insulating Wool can not rot or burn. It is highly resistant to moisture and vermin. You can rely on efficient insulation for the full life of your buildings.

Immediately available in a wide choice of standard and special forms designed to serve particular purposes and to simplify application. Paper enclosed **Batt** and **Roll Blankets** have a proper vapor barrier to control moisture condensation . . . nailing flange for easy recessed application. **Utility Batts** for packing between 16″ or 24″ studding—no paper enclosure or vapor barrier. **Pouring Wool** for hand pouring over finished ceilings . . . packing in narrow and irregular spaces. Nodulated for easy, even spreading.

Specify **INSULITE** Insulating Wool. You'll be giving your clients the highest quality flexible insulation—at a reasonable cost.



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Refer to Sweet's File, Architectural Section 10a/9

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REQUIRED READING

WRIGHT'S SULLIVAN

Genius and the Mobocracy. By Frank Lloyd Wright. Duell, Sloan & Pearce, Inc. (270 Madison Ave., New York 16, N. Y.), 1949. 8 by 10 in. xiv + 112 pp., illus. $5.00.

At long last here is the book which everyone expected and hoped Frank Lloyd Wright would write some day — his own personalized tribute to Louis Sullivan. It was worth waiting for: no one but Mr. Wright could have written it. No one else could have written it, in the first place, in the compelling, unusual and fascinating style which is peculiar to FLW, and which makes the book so largely what it is. No one else, secondly, could have so accurately put his finger on the genius that was Sullivan's. And above all, no one else could have given us such an intimate and understanding portrayal of the man whom Mr. Wright to this day calls his "lieber-meister."

This is not a biography, be it said right here and now. Nor, as Mr. Wright states emphatically in his opening pages, is it the tribute of the disciple to his master. Says Mr. Wright: "Not having so much to be humble about, I have tried — with honest arrogance — to describe the tragedy, triumph, and significance of the great man who invariably signed himself Louis H. Sullivan; to tell you why I, though never his disciple — nor that of any man — called him 'lieber-meister' . . . this book is the true story of a personal experience now necessary to put on the record, no more for his sake than for my own, because the historical view of each where the other is concerned is getting so badly out of focus that only I can right it. I meant to write not *as* the disciple I never was, nor the pupil he never wanted, but write as the capable workman who understood (that is to say, loved) the man he served — a man who loved him in return. From me should come appreciation of the master's work as the master himself saw his own work and as I saw him. But this book is not about him — it is about our work-life and struggle while we were together."

The person who opens this book (as who will not?) expecting to find it an interpretation of Frank Lloyd Wright as well as of Louis H. Sullivan will not be disappointed. There is much in it which has little if any bearing on Sullivan, but which is deeply revealing of FLW. This is particulary true of the first four chapters (comprising the first two books), which are concerned chiefly with Mr. Wright's own characteristic philosophy. To wit: "The truth is, we need originality more than it was ever needed to make good our claim to democratic freedom. Why can't we be honest about it? If one must steal it — steal it. Take it straight! Why fake it and spoil it?" And again: "Owing to a foolish, ignorant competition for technique before there is or can be any idea for which to use it, recourse to the 'ready-made' takes the place of the self-sacrifice of interior discipline."

The main portion of the volume, however, is a fairly factual account of the years Mr. Wright spent in the office of Adler and Sullivan. It is, of course, written in such a way that the interest of the reader is divided almost equally between the author and his subject. This is as it should be: the story is that of both men.

The Sullivan who emerges from these pages is heartbreaking: brilliant, beloved, sensitive (a lyric poet, says Mr. Wright), never in his lifetime given anything like the recognition he deserved, dying poor and broken and almost alone. He and FLW had quarreled years before, but fortunately had come together again and at the end were closer than at any time in their long friendship. Thus it was that Sullivan gave Wright a hundred or more of his beautiful drawings, many of which are reproduced here, asking, "Frank, you will be writing about these some day?" "Yes, lieber-meister, I will," FLW promised. That promise now has been kept — and kept handsomely.

POST (PERSIAN) WAR PLANS

How the Greeks Built Cities. By R. E. Wycherly. The Macmillan Company (60 Fifth Avenue, New York 11, N. Y.), 1949. 5½ by 8½ in. 228 pp., illus. $4.50.

This study of Greek architecture in its relationship to city planning has been made by a classical scholar who finds a similarity between the conditions and problems of the ancient Greeks and those of our own time.

Athens, Miletus, and many other Greek cities were leveled by the Persian Wars much as the cities of Europe have been destroyed by the world wars of the Twentieth Century, and were rebuilt from their ruins as Europe is planning to rebuild today. Mr. Wycherly finds that although some of the postwar planning of the Greeks called for mere restoration, many cities were able to create new plans which met the new needs of their citizens without imposing artificial grandeur. The men who rebuilt Miletus made good use of the gridiron system, a logical scheme which at the small Greek scale had not developed its modern disadvantages. Athens was able to restore its ancient monuments and to add new facilities, while other cities provided for expansion which occurred much as they anticipated.

The author discusses in detail the various types of Greek buildings: the fortifications; the agora; the shrines and official buildings; the gymnasiums, stadiums, and theaters; the fountain buildings; and even Greek houses, a subject of which he has made a particularly conscientious study.

Also of special interest are his observations of the effect of changing political systems on the face of the Greek city, as the acropolis, the ancient stronghold of the kings, was supplanted by the agora, the public gathering place of the citizens and the focus of legislative buildings.

How the Greeks Built Cities will be an invaluable reference work for historians and students of the classics, and it will also give modern architects and planners an enlarged view of their craft and its possibilities.

SHOPPING CENTER PLANNING

Shopping Centers: An Analysis. Seward H. Mott and Max S. Wehrly, Editors. Technical Bulletin No. 11. Urban Land Institute (1737 K St., N.W., Washington 6, D. C.), 1949. 8½ by 11 in. 48 pp., illus. $5.00 to non-Institute members.

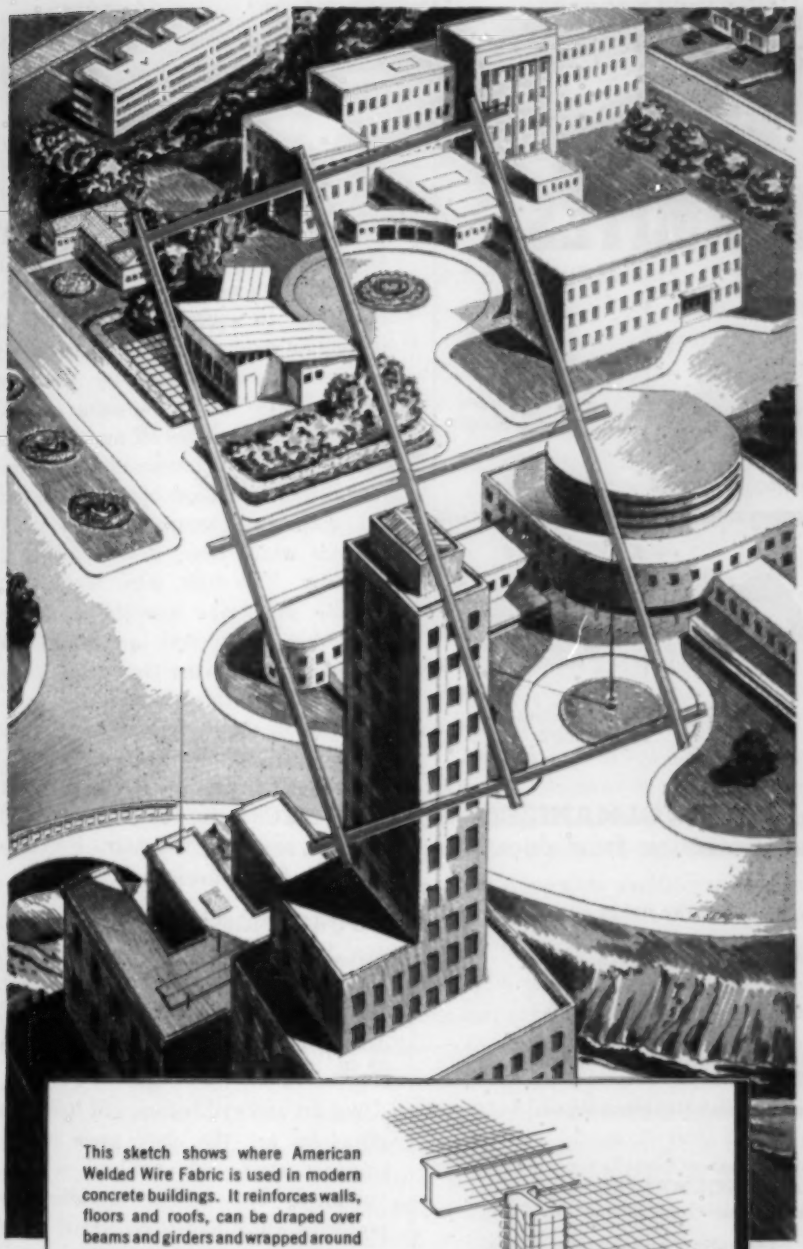
Here is an excellent small bulletin which will be welcomed by the architect about to plan a shopping center. Not only does it present 19 centers of varying sizes and in many sections of the country, describing and discussing each in detail; it also points out the good and bad features of each, analyzes the site plan, and gives dimensions and total floor area of each store included in the group. In addition, there are tables arranged to serve as a guide in the determining of parking space required.

The editors have arranged their material wisely: the 19 projects are presented first, and the general discussion follows. This permits the drawing of certain conclusions from the projects themselves, particularly on the tricky subject of how much parking space

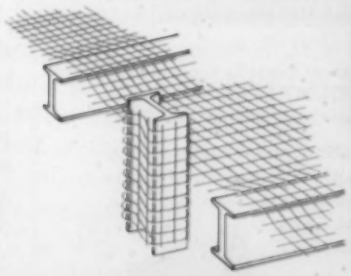
(*Continued on page 30*)

For these two important reasons

specify American Welded Wire Fabric



This sketch shows where American Welded Wire Fabric is used in modern concrete buildings. It reinforces walls, floors and roofs, can be draped over beams and girders and wrapped around pillars. Many uses of concrete in irregular structural shapes are made practical by American Welded Wire Fabric reinforcement.



First it is the most efficient reinforcement. Its many small members of cold drawn, high yield-point steel fortify all parts of the concrete structure. Rolls and flat sheets of American Welded Wire Fabric provide continuous reinforcement in buildings, bridges, tunnels, etc. It can be wrapped around pillars, beams and girders, laid in steps, stairs and other irregular structural shapes.

Second it is the most economical reinforcement. You need less steel, less concrete, when you specify American Welded Wire Fabric, for thinner slabs carry higher allowable stresses. The mesh can be placed quickly and easily, lies flat and stays in its proper place during all construction operations. All of which adds up to important savings in construction time, in material and labor costs.

These are the main reasons why so many architects and engineers specify American Welded Wire Fabric reinforcement for all types of concrete construction . . . not only in skyscrapers, hospitals, and schools, but in fine modern homes and in small home developments as well.

When you are planning any kind of concrete construction our technical staff will be glad to supply complete data on specific design and standard styles of fabric that are available. Write to our nearest office today, you incur no obligation.

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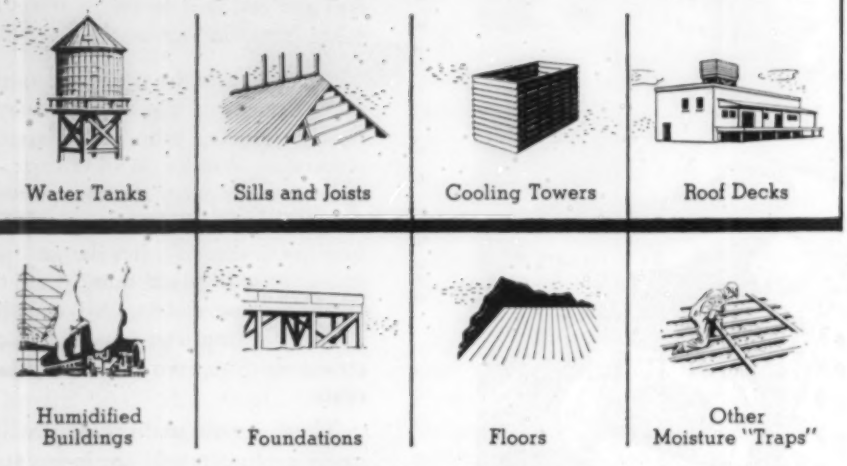
pages 31 through 84: missing noted APR 1 1960

WOLMANIZED PRESSURE TREATED LUMBER

Means Absolute Protection to Wood Endangered by ROT and TERMITES



Here are six common conditions where WOLMANIZED Pressure-Treated Lumber provides protection from decay and termites:

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2. Where wood near the ground is open to termite attacks.
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4. Where steam and vapor from industrial processes promote wood decay.
5. Where walls, floors, ceilings are subject to condensation from refrigeration.
6. Where wood is exposed to moisture in artificially humidified buildings.

Investigations by qualified technologists prove that on installations where decay and termites ordinarily shorten lumber life, WOLMANIZED Pressure-Treated Lumber lasts *Three to Five Times Longer* than untreated wood.

Such lasting protection is assured because penetrating, preservative solutions are forced, by vacuum-pressure treatment, deeply into the wood fibers of WOLMANIZED Lumber. And, WOLMANIZED Lumber is clean, odorless, paintable, non-corrosive, non-leaching and glueable. Only WOLMANIZED Lumber offers *all* these extra advantages.

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REQUIRED READING

(*Continued from page 28*)

must be provided. This, probably more than anything else, recommends the bulletin to the architect.

NEW UNDERWRITERS CODE

National Building Code, 1949 Edition. Recommended by the National Board of Fire Underwriters. (85 John Street, New York 7, N. Y.), 1949. 6 by 9 in. 258 pp.

This 45th edition of the National Building Code contains revised provisions for fire safety, having been rewritten "to conform to the advances in knowledge and experience which have resulted from new methods and materials, and to suggest new methods of protection required by new hazards." It is designed for adoption by American municipalities with a minimum of local change, and regulates all matters relating to the construction, alteration, removal, or demolition of buildings, and to equipment, occupancy, and maintenance which must be considered in planning. The code does not specify definite materials, assemblies, or designs, but rather sets up performance requirements, leaving the actual choice of materials to the architect.

Copies of this code may be obtained at the offices of the National Board of Fire Underwriters at 85 John Street, New York City; 222 West Adams Street, Chicago, and 1014 Merchants Exchange Building, San Francisco.

GOTHIC ENGINEERING

Cathedrals and How They Were Built. By D. S. H. Cranage. Cambridge University Press. Distributed by the Macmillan Company (60 Fifth Avenue, New York 11, N. Y.), 1948. 8½ by 6½ in. 60 pp., illus. $2.50.

Not art and symbolism, but structural principles are the chief topic of this compact study of medieval religious buildings. The author describes the problems which had to be solved before succeeding types of vaults and domes could be made to stand securely, and shows how builders used the materials at hand to work out solutions. Not all cathedral building was uniformly dependable, however, and the book contains some interesting accounts of structures that failed soon after building, and of special reinforcement techniques that have been worked out to preserve ancient pillars and foundations.

This book is illustrated with line drawings of details and 20 photographs of cathedral interiors.

ARCHITECTURAL

RECORD

DELIGHT AND DISTINCTION

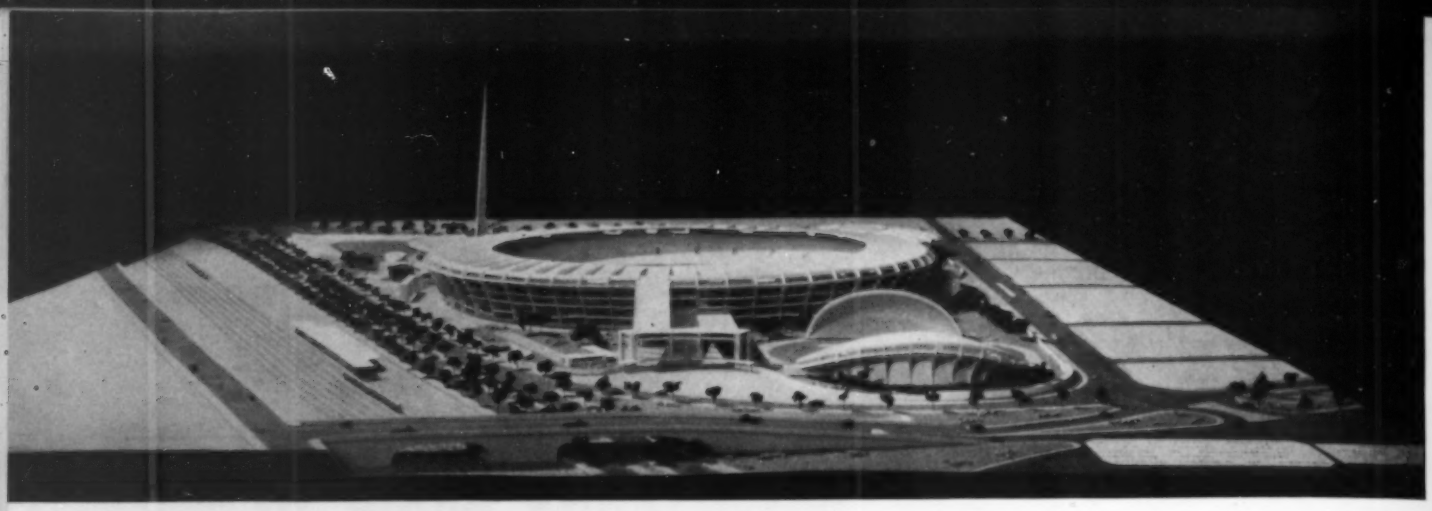
Of the familiar triumvirate, "Commodity, Firmness and Delight," it is Delight that has identified the art of architecture. Firmness and Commodity can be, and have been, produced by others, but Delight has been deemed the special province of the architect; it has been up to him to produce the delight. There have been times of architectural artfulness and artiness when delight was thought to be produced by adding visual frosting to hide the elements of firmness and to embellish the commodity. And more recently there has been the notion that firmness and commodity would in and of themselves produce delight, a notion of purely physical functionalism. While the results of this philosophy may have produced delight in the minds of their creators and their esoteric coteries, they too often struck no responsive note in the hearts of the uninitiated public. Both were attempts to separate rather than integrate the "three graces" of architecture.

There is ample and encouraging evidence, however, that we are witnessing the evolution of an architecture that is neither crude firmness nor nude commodity, nor is it appliquéd delight. It is an architecture that Frank Lloyd Wright might term "organic" (though he seems to despair of the capabilities of other architects to develop it — and Dean Hudnut bemoans the arid American desert where it must grow). It is an architecture that fulfills its tripartite functions, physical, rational and emotional, through a reintegration of commodity, firmness and delight.

This developing new architecture is the product neither of mere structural science nor of decorative virtuosity, but of the conscious effort of men who, technically informed in the realms of both firmness and commodity, are creatively sensitive to the delight of form, texture and color, to proportion, profile and pattern. It is this personal attribute of creative sensitiveness in the designer, this feeling for the appropriate shapes, sizes and materials that produces the delight in architecture which can be shared alike by the profession and the public. It is this that distinguishes architecture from building; it is this that makes architecture both distinctive and distinguished. It is more than knowledge, more than a science, more than an esthetic philosophy or an intellectual credo, more than a bag of current clichés — it is a quality of spirit inherent in the individual designer and made manifest through his ability to express and communicate his ideas graphically. No following of formulae, no adherence to an abstract philosophy, no facility with an extensive verbal vocabulary can take the place of the designer's innate sensitivity and developed powers of graphic expression. Through the latter only can he provide others with the accurate guide to the construction of distinguished buildings. Neither can originality, inventiveness or novelty (no matter how much publicity they beget) ever take the place of these essential elements in the creation of architecture of lasting delight and distinction.

Kenneth K. Stowell

EDITOR

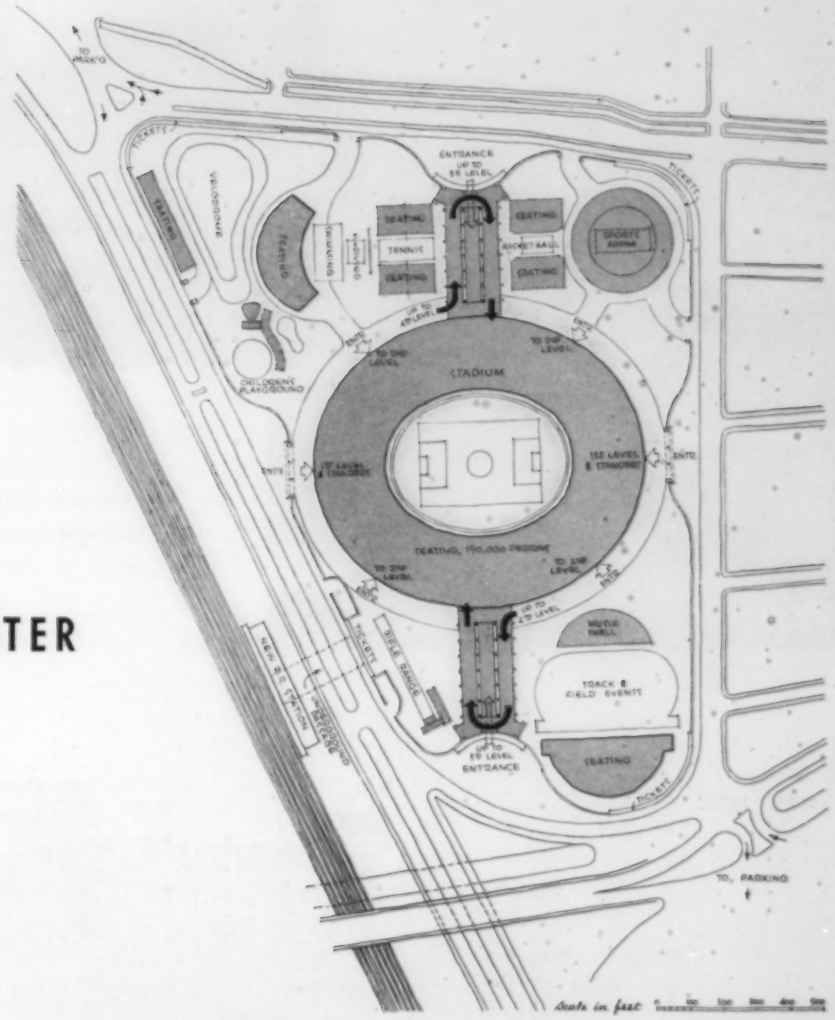


REINFORCED CONCRETE STADIUM, FIRST UNIT OF

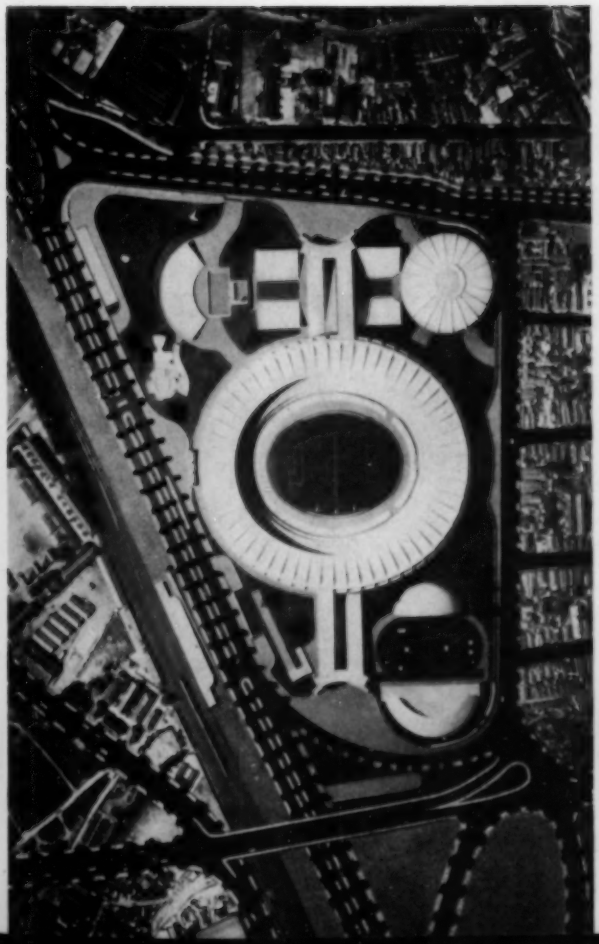
Rio de Janeiro, Brazil

Raphael Galvao, Pedro Paulo Bastos, Antonio Dias Carneiro, Orlando Azevedo, Architects

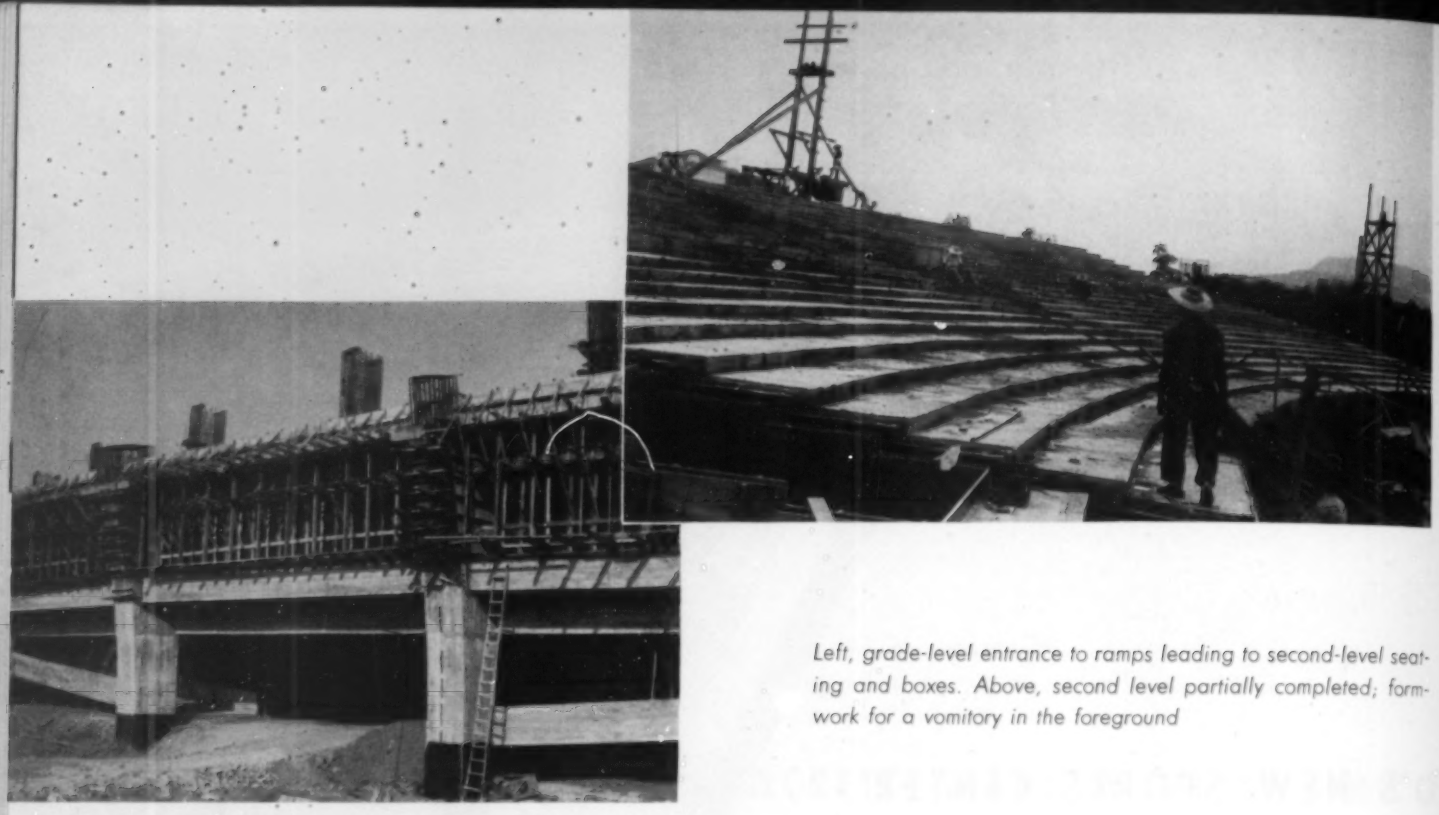
Structural design was the responsibility of Paulo Fragoso, Noronha, Baungart, and Costa, Engineers. The stadium is being built by an association formed by a group of the largest construction firms in Brazil



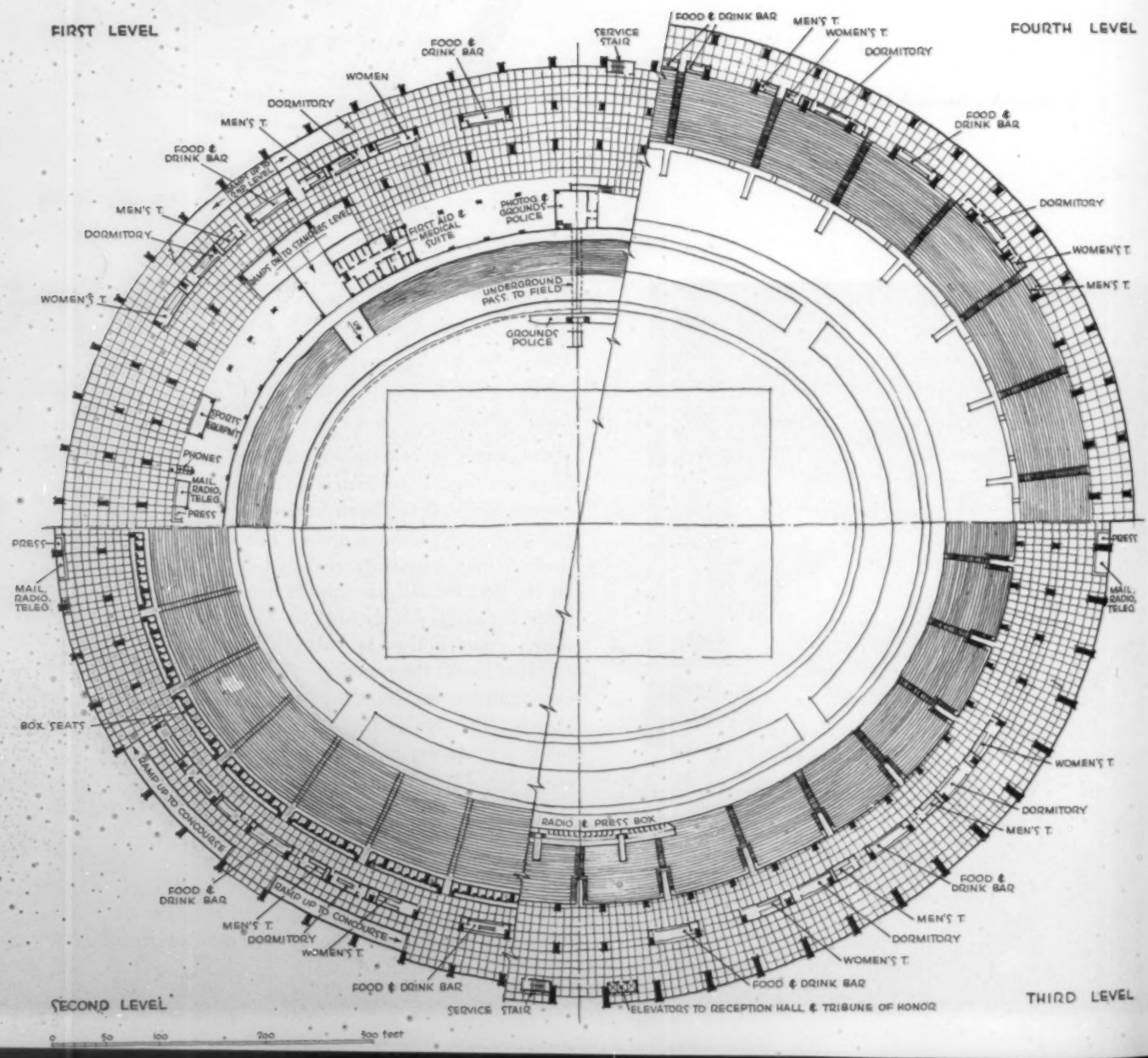
OF RIO'S NEW SPORTS CENTER

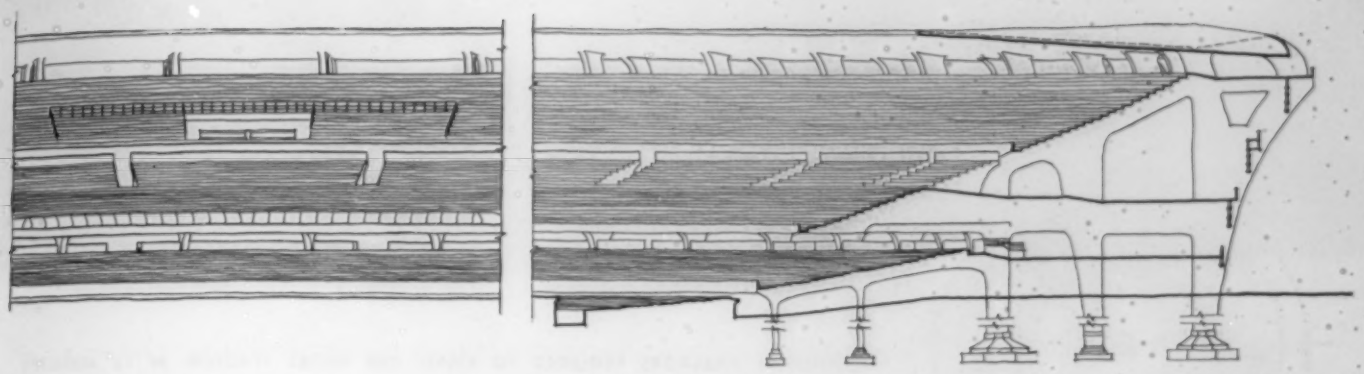


FOR some years a municipal stadium has been projected for Rio de Janeiro. Like all such monumental undertakings, it has been subject to the changeability of political and public opinion; but with the advent of the new city administration of General Angelo Mendes de Moraes, municipal support became assured and construction started early in 1948. As of the present writing, rough construction is substantially complete on the stadium itself; the remainder of the buildings which will eventually comprise the sports center have not been started. The site occupies several blocks in the approximate population and topographic center of the city, accessible by means of street cars, by automobile along superhighways, by bus, and by electric and steam railroad. According to present plans, a large railroad station is to be built solely for the stadium and sports center. The stadium will seat 150,000 people; each of the eight grandstands, when built, will accommodate from 40,000 to 60,000, and the gymnasium another 80,000.

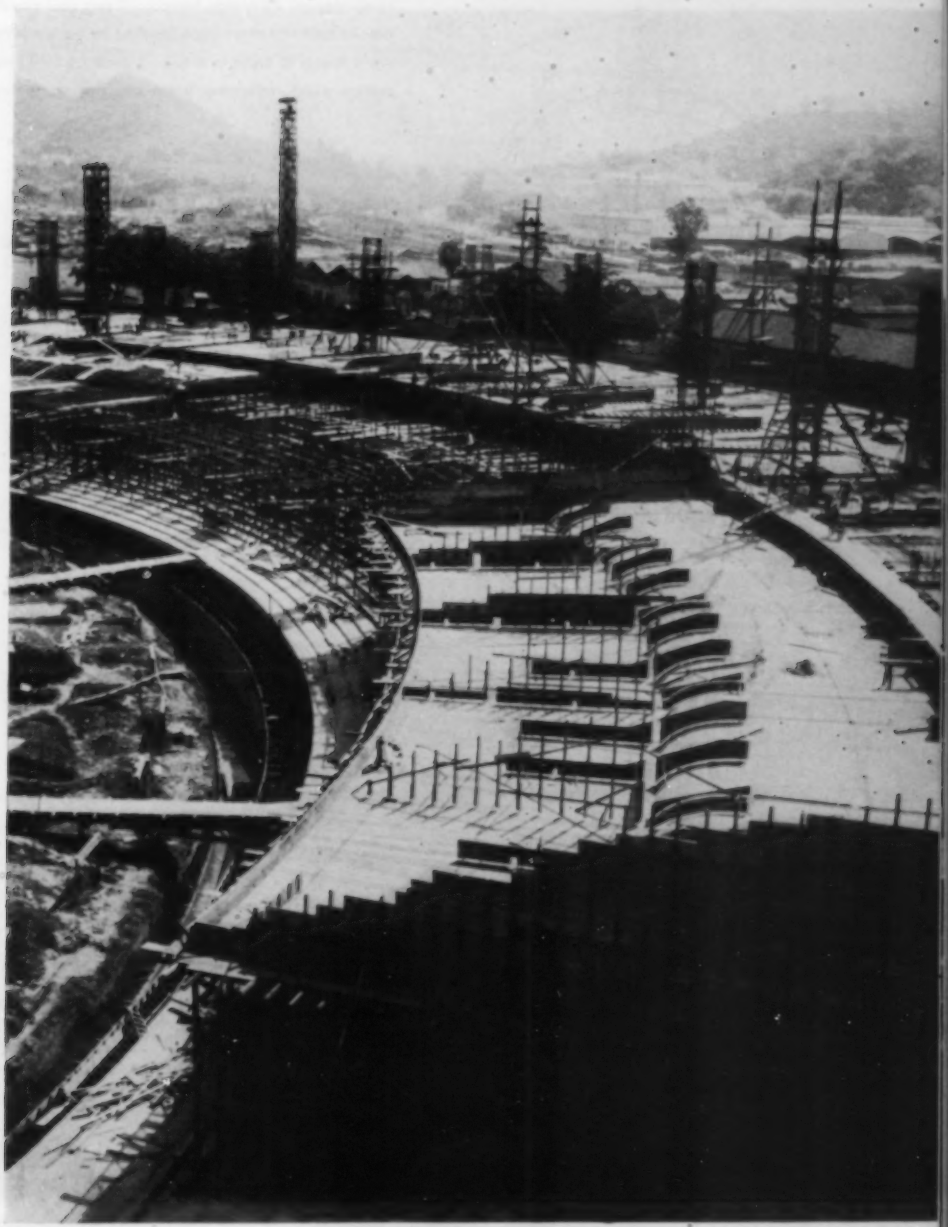


Left, grade-level entrance to ramps leading to second-level seating and boxes. Above, second level partially completed; formwork for a vomitory in the foreground

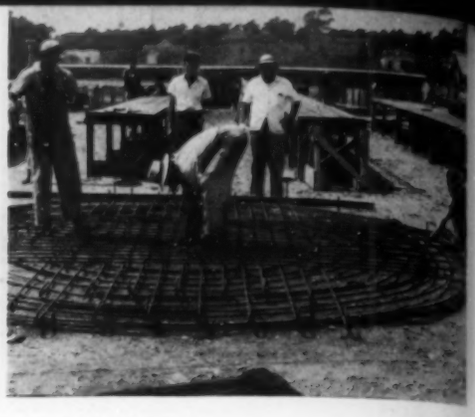


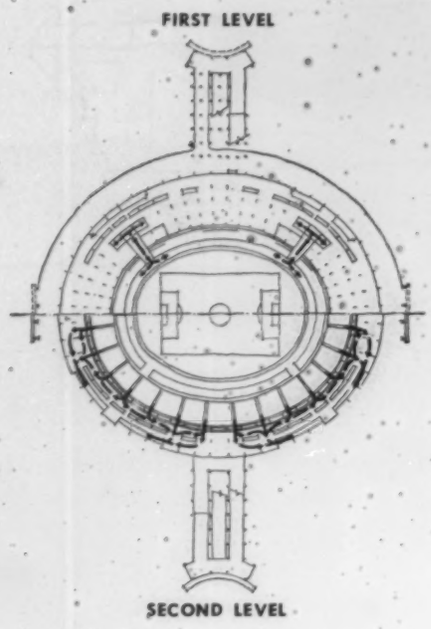


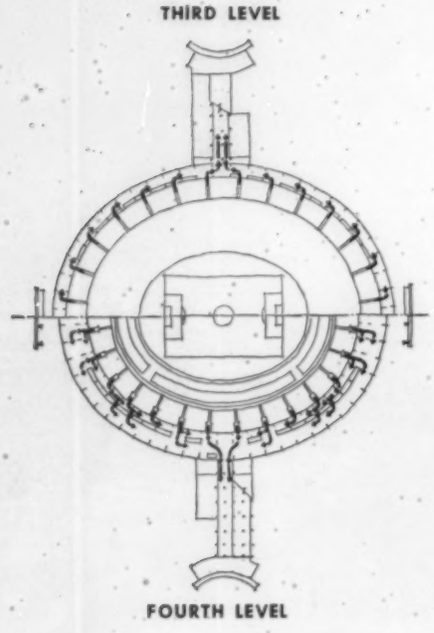
Section shows unusual accommodations for standees and seated spectators: at lowest level, standees' platforms are lower than the playing field, their eye level is slightly above; successive tiers rise until highest standees' platforms are at field level. Upon entering, standees walk to a depressed passage which encircles the stadium and proceed by ramps to the concourse in front of their platforms. Another depressed passage in front of this concourse provides employees and athletes access to field with minimum disturbance. Note tribune of honor in center, press box immediately below



At right, second-level construction complete, third level forms started. "Towers" are forms and reinforcing for ducts which ventilate dormitories, toilets, and concessions located on each principal level. Within the stadium itself are sleeping quarters for 880 athletes







WIDTHS OF PASSAGES REQUIRED TO EMPTY THE ENTIRE STADIUM IN 15 MINUTES

Speed in emptying the stadium is mandatory; this was the subject of much study which may be summarized as follows:

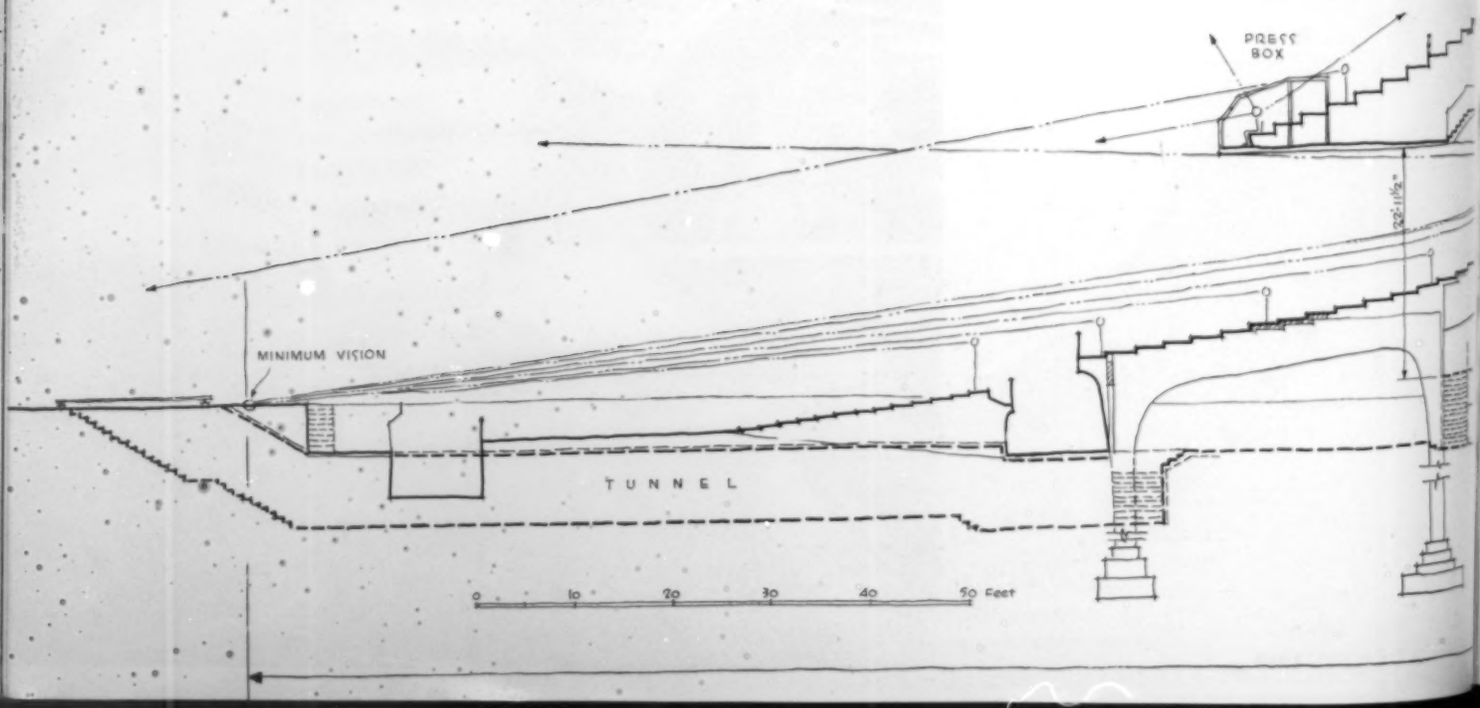
Formula: $\frac{n}{1.25\,t}$, where n = number of people, and t = time in seconds, which gives width in meters of passageways required. Separate calculations were made for each level.

Similar calculations were made to determine ramp requirements; these formed the basis for the entire ramp design. All ramps have a 10 per cent gradient. As an example, ramps leading to the top level were found to have a required area of 6900 sq. meters which, assuming 8 persons per sq. meter, would accommodate 55,000 people — an ample margin of safety over the level's 49,000 (approx.) capacity. This meant that when the ramps were full there would be no people left either in the seats or on the concourse, and determined slab thickness as well as column size and spacing for the ramps. This level could be emptied in 6 minutes after the throng had filled the ramps. For the entire stadium, it was determined that the total capacity (153,000) could be evacuated at the rate of 10,200 persons per minute in 15 minutes, which, considering the total exit width of 158 meters, meant 64 persons per minute per meter of opening. This was considered reasonable.

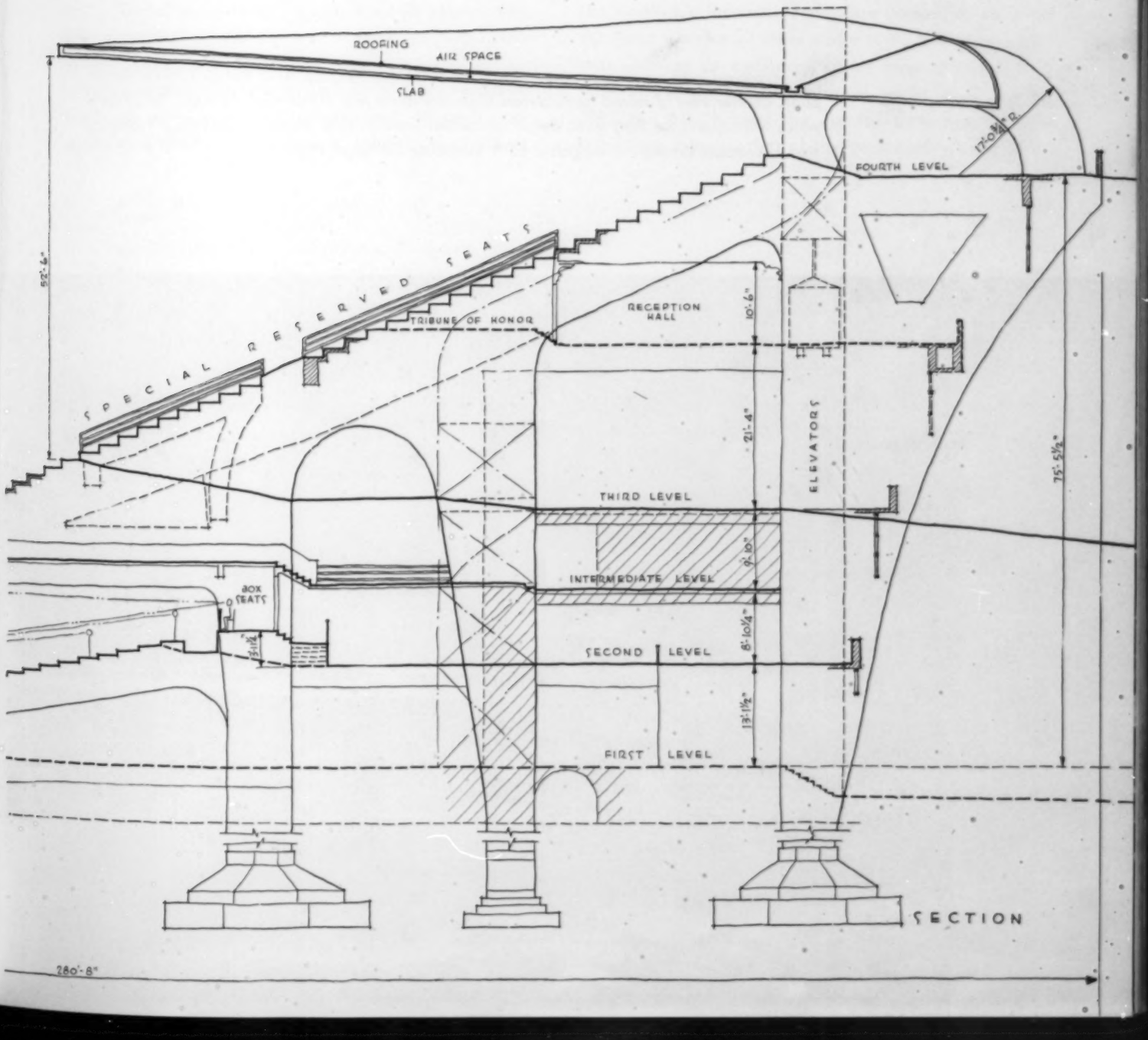
Level	$\frac{n}{1.25\,t}$	Req'd Width (Meters)	Width Provided (Meters)
First (incl. standing)	$\frac{30{,}525}{1.25 \times 900}$	27.13	32.00
Second (incl. boxes)	$\frac{30{,}000}{1125}$	26.66	36.40
Third	$\frac{43{,}750}{1125}$	38.80	42.00
Fourth	$\frac{48{,}815}{1125}$	43.30	48.00

TOTALS, Calculated in meters and feet

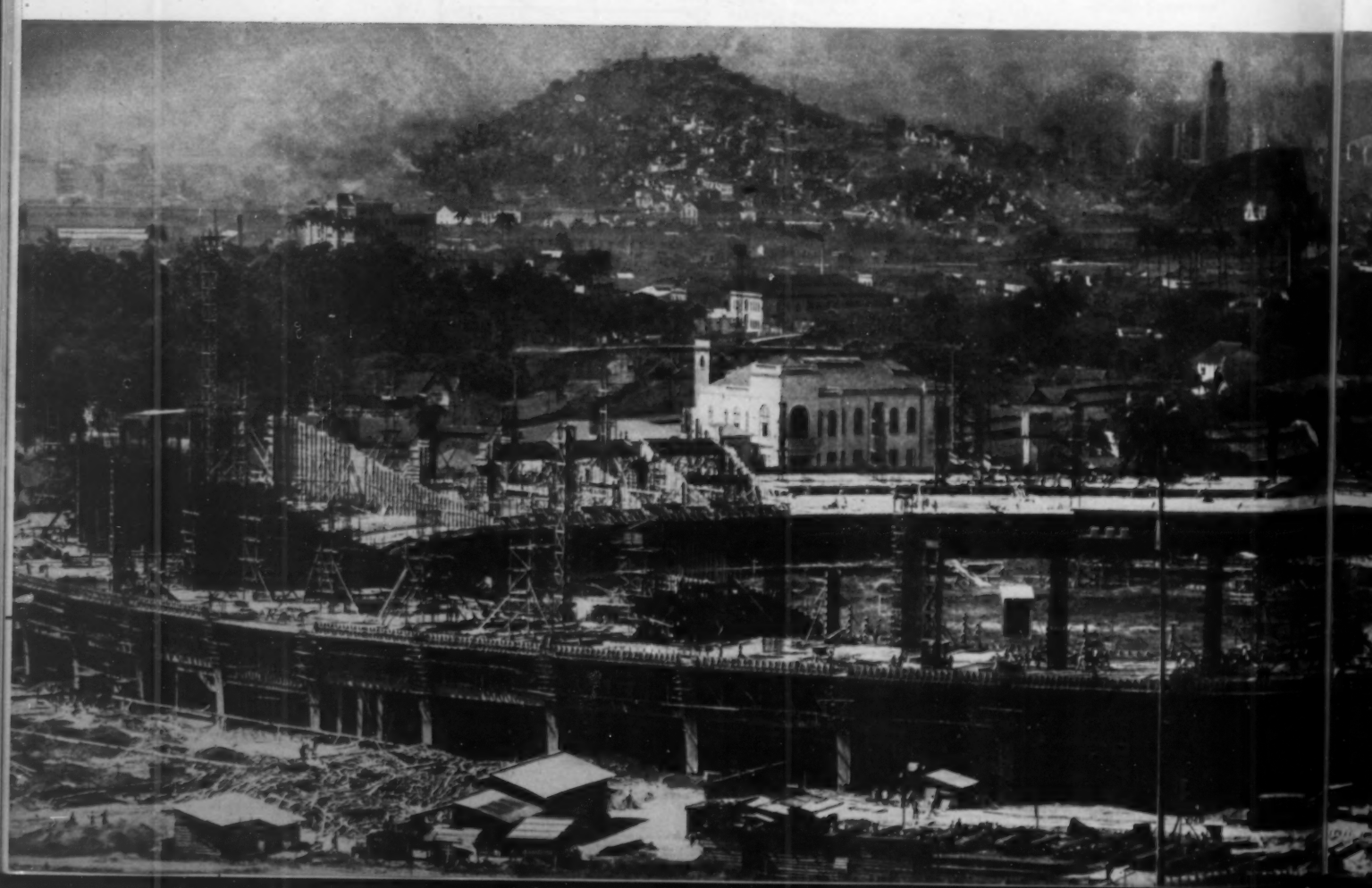
Level	Width Required	
	Meters	Feet
First	27.13	89.0
Second	26.66	87.5
Third	38.80	127.3
Fourth	43.30	142.0
Grand Tot.		
Requ'd.	**135.89**	**445.8**
Provided	**158.00**	**518.4**



Photos showing construction progress: across page, placing reinforcing for main column footings, Sept. 19, 1948. This page, left, forms for lower portions of columns, August 23, 1948; center, pouring and finishing second level, January 30, 1949; right, formwork for third level being constructed, March 6, 1949. Section below shows the several kinds of circulation: to administrative offices (shaded area), also to press box, at intermediate level; from athletes' dormitories (shaded vertical area, on several levels) via passage under stadium to dressing room and thence by tunnel to field; by elevator to reception hall and tribune of honor; and spectators' circulation by ramps to concourses at the various public levels, from which other ramps lead to seating tiers



Above, second level construction completed, forms under way for third, as of April 23, 1949. Across page, another view of second level; private boxes are at the rear of this level, between the columns which will support the third level. Below, panoramic view at same stage of construction, showing start of complex formwork to support a 65-ft. cantilever during pouring



One cannot help admiring the thoroughness with which every aspect of the project's design has been studied. Of course things may not work out as well in practice as the scheme would lead one to expect, but certainly no provision for the spectator's comfort which could be determined in advance has been overlooked. An assemblage of 150,000 to 153,000 people can not only arrive at this stadium easily; it can, it would appear, buy tickets in relative comfort (note in plan the long banks of ticket windows); find seats with comparative ease (separate means of access to each level); buy sweets or drinks at the innumerable concessions on each concourse; and when the show is over, get from the farthest seat to an exit in 15 minutes or less, and, once outside, make a choice of all the methods of transportation the city affords, to find the way home without undue delay. For parents who must bring children, there is a playground where the small fry can be left under supervision. Visibility from all stands has been mathematically calculated; all steps have varying heights, so that the stadium's internal profiles are curves; apart from the great number of seats under roof, it is remarkable that so large an audience can be accommodated in a structure which has a maximum height of 23 meters (75.5 ft.) Also noteworthy are the tremendous cantilevers; the longest, that of the main roof, is over 98 ft.

THE THREE PHASES OF POSTWAR RECOVERY

By Thomas S. Holden
President, F. W. Dodge Corporation

Postwar recovery follows a three-phase sequence:

I. THE SHORTAGE AND BACKLOG PHASE.
II. THE MARKET ADJUSTMENT PHASE.
III. THE ECONOMIC EXPANSION PHASE.

Proper analysis of current conditions requires that current facts be viewed in relationship to this sequence.

PHASE I. The Shortage and Backlog Phase.

This phase lasted from V-J Day until about August, 1948. It was characterized by the following conditions and business developments:

Reconversion of industry.
Plant expansion and modernization.
Capacity production of civilian goods (including housing).
Shortages.
Speed in filling orders more important than price, production efficiency, quality of goods or cost control.
Commodity price inflation.
Rising wages; strikes in key manufacturing industries and other labor troubles.
Irregular deliveries; overtime work and overtime pay; swollen costs.
Backlogs of unfilled orders (manufacturers, wholesalers, dealers).
Many new businesses started (architectural offices, producers, dealers, contractors, subcontractors).
Sellers' markets (gray markets in some lines).

PHASE II. The Market Adjustment Phase.

Pipe lines were filled, shortages overtaken, and price peaks reached at different times in different lines of agriculture, raw material extraction, and industry. It is convenient to consider September, 1948, when B. of L.S. all-commodity index of wholesale prices turned down, as the date when Phase II began.

Commodity price adjustment is the essential final step of reconversion to a peacetime economy. A downward adjustment of commodity prices cannot, apparently, be effected without some degree of business recession.

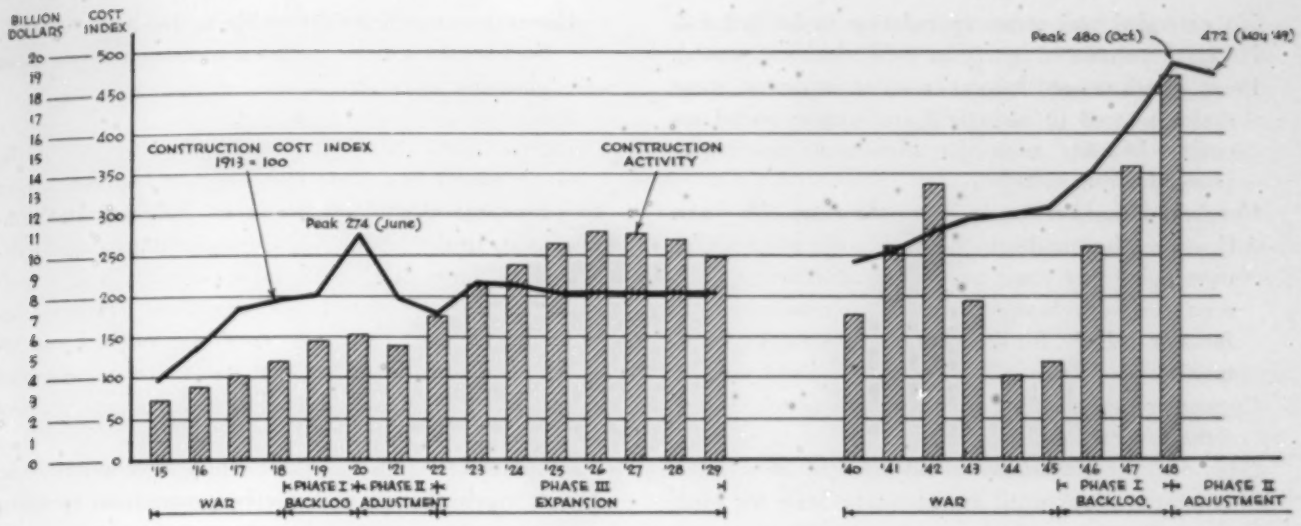
Since this analysis is being made at a time somewhere near the midpoint of the adjustment phase, it must be presented in some detail.

1. Characteristics of Market Adjustment Phase.

Supply overtakes demand in most lines.
Acute shortages, gray markets, order backlogs disappear.
Consumers become price conscious, quality conscious.
Jobbers and dealers shorten inventories, reduce orders, buy on a hand-to-mouth basis.
Pipe lines being filled, market pressures back up on processors and raw-material producers.
Expansion programs of industry and merchandising organizations cut back or postponed.
Manufacturing, business, construction volume, employment decline.
Prices tend downward, artificial inflationary cost factors disappear; productivity of labor increases.
Cost reduction and cost control resume normal importance.
Buyers' market returns.
Competitive pricing, competitive selling and sales promotion.

2. The Adjustment Record to July 1, 1949.

Physical volume of production down from 195 in November, 1949, to 169 in May, 1949, according to the Federal Reserve Board's index. (An index of 169 means 69 per cent over the 1935–1939 average.)
Total retail trade in first five months of this year about the same dollar volume as 1948; department store sales down about 3 per cent.
Wholesale prices of all commodities (B. of L.S. index) down from 169.5 in August, 1948, to 152.9 at the



Source: Construction Activity — U. S. Dept. of Commerce Construction Cost Index — Engineering News Record

U. S. CONSTRUCTION — ACTIVITY AND COST FLUCTUATIONS • TWO WAR AND POSTWAR PERIODS

end of June, 1949 (approximately 1⅔ points per month).

Civilian employment down from 61,296,000 in June, 1948 to 59,619,000 in June, 1949 (less than 3 per cent).

Housing starts in first six months this year down about 6 per cent from 1948.

Construction contract volume (F. W. Dodge Corporation figures) for 37 eastern states:

Fourth quarter 1948 dollar total 2½ per cent under fourth quarter 1947; new building floor space down 15 per cent.

In the first six months of 1949, dollar volume of all construction down 6 per cent from 1948; new building floor space down 14 per cent.

Increased public building and engineering work not enough to offset decline in private contracts. (Total dollar volume of contracts in first six months of 1949 greater than in corresponding period of any recent year except 1948; new building floor space contracted for in first six months of 1948 greater by 42 per cent than new floor space in first six months of 1940.)

Building costs in May, 1949 ranged from *same* to *lower* compared with May, 1948, and were down from the peak of late Summer 1948 by at least 5 per cent in May of this year. This is an interpretation based on a composite of building cost indexes and F. W. Dodge Corporation's opinion survey among builders. (See ARCHITECTURAL RECORD for July, 1949, pages 104–105.)

3. *Adjustment Incomplete, Due to Continue.*

As of July 1, the adjustment is incomplete, for the following principal reasons:

The public expects further price cuts, buys cautiously, shops for bargains.

Jobbers and dealers expect further price cuts, buy on hand-to-mouth basis.

Some industries (notably automobiles) have not yet caught up with backlogs.

Reduced raw material prices have not been fully reflected in reduced prices of manufactured goods.

Industry has doubts about fourth-round wage demands, labor troubles.

Business and industry have doubts about Congress action on labor legislation, taxation, proposed welfare legislation, government spending.

Business and industry are not fully readjusted to competitive selling in buyers' markets.

Some business enterprises are due to fold up, particularly small new ones started during the inflationary boom.

Building contractors who participated in F. W. Dodge Corporation's opinion survey in May expect cost decline to continue until about November, 1949. (See ARCHITECTURAL RECORD, July, 1949.)

In the light of present facts, the recession may continue during the remainder of 1949, possibly into the first part of 1950.

4. *This Is a Remarkably Mild Business Recession.*

Compared with the 1920–1921 commodity price deflation, there are many more differences than similarities.

Various industries (including farm production) caught up with shortages at different times, not all at once; a series of minor shocks to the economy, not one concentrated big shock.

This time, no big security speculation to be deflated. Security trading in the postwar period has been practically on a cash basis, volume has been comparatively small; no large liquidation to be expected. Security price drop in May can be interpreted in terms of expectation of reduced corporate profits; does not necessarily foreshadow important decline in consumer purchasing power.

No extended real estate speculation to be deflated.
No large volume of mortgage foreclosures expected.
Farm prices pegged by government supports; wage scales pegged in unionized industries; social security benefits maintain minimum purchasing power for unemployed.
Congress is unlikely to increase tax rates this year.
Adjustment has made much progress already without developing any panic psychology. Barring unforeseen world developments there is no reason in basic facts or in logic, for development of panicky sentiment.
Consumer purchasing power and individual savings remain very high.
Odds favor continuance of adjustment in a mild, orderly manner until an adequate basis for business upturn is reached.

PHASE III. The Economic Expansion Phase.

Market adjustment is a preparation for resumption of postwar recovery on an ever widening front. The natural peacetime course of a dynamic society like ours, when maladjustments have been corrected, is economic expansion.

Potential expansion factors in the American economy are very great, perhaps greater than ever before. They include: our growing population, our position of world leadership, our high productivity, our tremendous volume of liquid savings, our habits of ready adaptation to change, our high competence in business and industrial management and construction techniques, the energy and resourcefulness of our people.

Characteristics of an economic expansion period include:

Commodity prices approximately stabilized, fluctuations within comparatively narrow ranges.
Increased productivity per man hour; modernization of plants and processes; improved quality of goods.
New community facilities to accommodate population growth, rising living standards, rising community standards; prosperity.
New products, new industries.
Rapid expansion of particular industries.
Possible emergence of some bellwether industry (like railroads and automobiles in the past) to lead in general economic expansion (perhaps industrial applications of atomic energy).
New building and engineering facilities required for each new economic and social development.
Competitive selling; improved market methods.

QUESTION: Will Government Policies Encourage Private Enterprise and Private Investment?

Market adjustment creates *economic* conditions favorable to expansion. It is also necessary that *political* conditions create a favorable climate.

Requirements of favorable political climate:
Incentives to savings, private investment and private enterprise.
Government policies favorable to business, without backbreaking taxes, without too much government planning and control.
Reduction of federal spending.
Improved world conditions and increased world trade.

Government has made less progress in reconverting to peacetime than have business, industry and construction. In the summer of 1949, the 81st Congress debates measures of critical importance for the future: labor-relations legislation, social welfare legislation involving increased taxes and spending and a trend toward what is called the social welfare state, a record peacetime budget, proposals for budget cutting, proposals for increased federal taxes.

Preponderance of evidence is that an economy overtaxed, overburdened with costly government spending programs, overregulated by government planning and controls tends toward stagnation and reduced living standards. Government planners talk economic expansion, believe government must direct it in many detailed ways which actually devitalize the energy of dynamic free enterprise.

The kind of future the American economy will enjoy and the nature and extent of its expansion will be determined largely by the decisions of the 81st Congress, by the decisions of the voters in the 1950 Congressional elections, by the campaign issues and election results of 1952.

While conditions are likely to favor an upturn in business, industrial and construction volume in early 1950, there will still be unresolved economic and political problems. Expansion is therefore likely to proceed at a moderate pace for a year or two after resumption of the upward recovery trend.

CONSTRUCTION IN AN EXPANSION ERA

Expansion involves a wide variety of new activities throughout the whole range of economic and social development. Every new activity of importance generates needs for new building and engineering facilities; there are needs for added facilities, needs for new types of facilities.

Some general observations about construction demands of the 1950's can be made, based on the assumption that there will be a predominantly favorable economic and political climate.

Commercial building would be due to increase in proportion to the prosperity of the country; further decentralization of industry, population and trade will create new demands.

Industrial building would be due for large increase over the current rate (dependent on prosperity in the United States, world trade improvement, incentives to private investment); new factories and equipment for cutting production costs, for modernization and decentralization of industry, for new industries; if and when atomic energy is adapted to industrial uses, revolutionary changes may be ahead.

School building is due for continuous increase; enrollments in elementary and high schools will increase

from 26,000,000 in 1949 to 34,000,000 in 1958; colleges will need increased facilities.

Hospital building is probably due for continuous increase, with or without federal aid; there is strong public sentiment for improved and expanded health service.

Public buildings for administration and community service would tend to increase with general prosperity and with community development, though there is no present indication that this class of operation will assume major importance.

Religious buildings and *social* and *recreational buildings* are likely to increase with general prosperity.

Residential building should continue relatively high, probably less than the 1948 volume during the next several years; acute shortages have been met, the rate of new family formations has fallen considerably from the 1947 peak and is likely to continue during the 1950's at a lower rate than in the war and early postwar years (the low birth rate of the 1930's results in fewer people of marriageable age in the 1950's). Rental housing currently lags behind, particularly in larger cities, indicating need for increased building of apartment houses (perhaps a combination of public housing, cooperative housing and investment housing). With prosperity, new building to replace substandard housing likely to increase, but not at rates indicated in propaganda estimates of recent years. Single-family houses built to order for owners' occupancy likely to increase in proportion to national prosperity.

(In 1943 F. W. Dodge Corporation estimated postwar housing volume at the average rate of 820,000 new non-farm dwelling units a year during the first ten postwar years. During the first four postwar years [1946–1949] average housing production will be quite close to 820,000 units. In view of the potential demand situation outlined above, it is doubtful whether the average of the next six years will exceed 820,000 units.)

Heavy engineering construction, both publicly and privately owned, is likely to increase continuously to keep pace with needs for expanded community facilities, power, traffic and transportation needs and the like. Large backlogs of planned projects exist at the present time.

NOTES ON BUILDING COSTS SURVEY

The opinion survey conducted by F. W. Dodge Corporation in early May among representative contracting organizations throughout the country gave a cross-section picture of the industry midway in the process of cost stabilization. (A factual report of survey results was published in the July 1949, ARCHITECTURAL RECORD.)

Abnormal Cost Factors Are Nearly, If Not Quite Out of the Picture. — Preponderant evidence was that irregular deliveries of materials, excessive time required for shopping for materials and overtime pay are a thing of the past in most building markets, probably on the way out in others. Some materials were then noted as being still in short supply in some markets, some still at peak price levels. There was a general consensus of opinion that productivity of on-site labor had improved, 10 per cent being the most frequently mentioned measure of the degree of improvement. Lump-sum contracts have again become the predominant procedure, contrasted with the high prevalence of cost-plus-fixed-fee contracts in the war and early postwar years; normal peacetime competition has returned to the contracting field.

How Much Decline from the Peak? — The question put to the builders was the extent of the decline in building costs from May, 1948 to May, 1949. The consensus of answers was a 5 per cent drop in the 12 months. Published cost index numbers indicate that the May, 1949 figure was very close to that of May, 1948, and that the peak of construction costs was reached about October 1948. A possible explanation of the apparent discrepancy is that a majority of the builders who answered the question were actually thinking in terms of the decline from the peak, instead of trying to recall the cost levels of May, 1948. The range of declines as reported by builders was from *no change* for single-family house costs in the Mountain States to a 10 per cent decline in similar building in the Pacific States, and from a 3 per cent drop in larger-type building costs in the Mountain States to an 8 per cent drop for similar buildings in the South Atlantic States.

Cost Down Trend Expected to Continue a Few Months Longer. — Preponderant opinion of contractors was that cost declines could be expected to continue for about six months, which would carry it to next November. The median expectation was for a further drop of 8 per cent from May levels. If realized this would bring average costs down within the range of 15 to 20 per cent below the peak. A majority of contractors expected continued improvement in productivity of on-site labor, which would be a factor in further cost reductions.

Is It Advisable to Build Now? — In buying construction, as in other purchases, it is almost impossible to strike the exact bottom of the market. For urgent projects, the cost of waiting has to be weighed against potential reductions. Projects for which plans and sketches are started now stand a chance of finding a highly favorable market when the projects are ready for bids. Even now, contractors are apt to give consideration to their expectations of further cost reductions in making estimates and bids.

The public probably expects deeper cuts in construction costs than those which will actually come about. This is a factor tending to deferment of projects. Some effort will be required on the part of architects, builders and others in the industry to convince prospective owners as to the values to be expected for current building dollars. Since wholesale prices of all commodities are still about double their 1939 average, current building costs are not out of line.

Richard Garrison Photos

RAMBLING RESIDENCE IN KENTUCKY

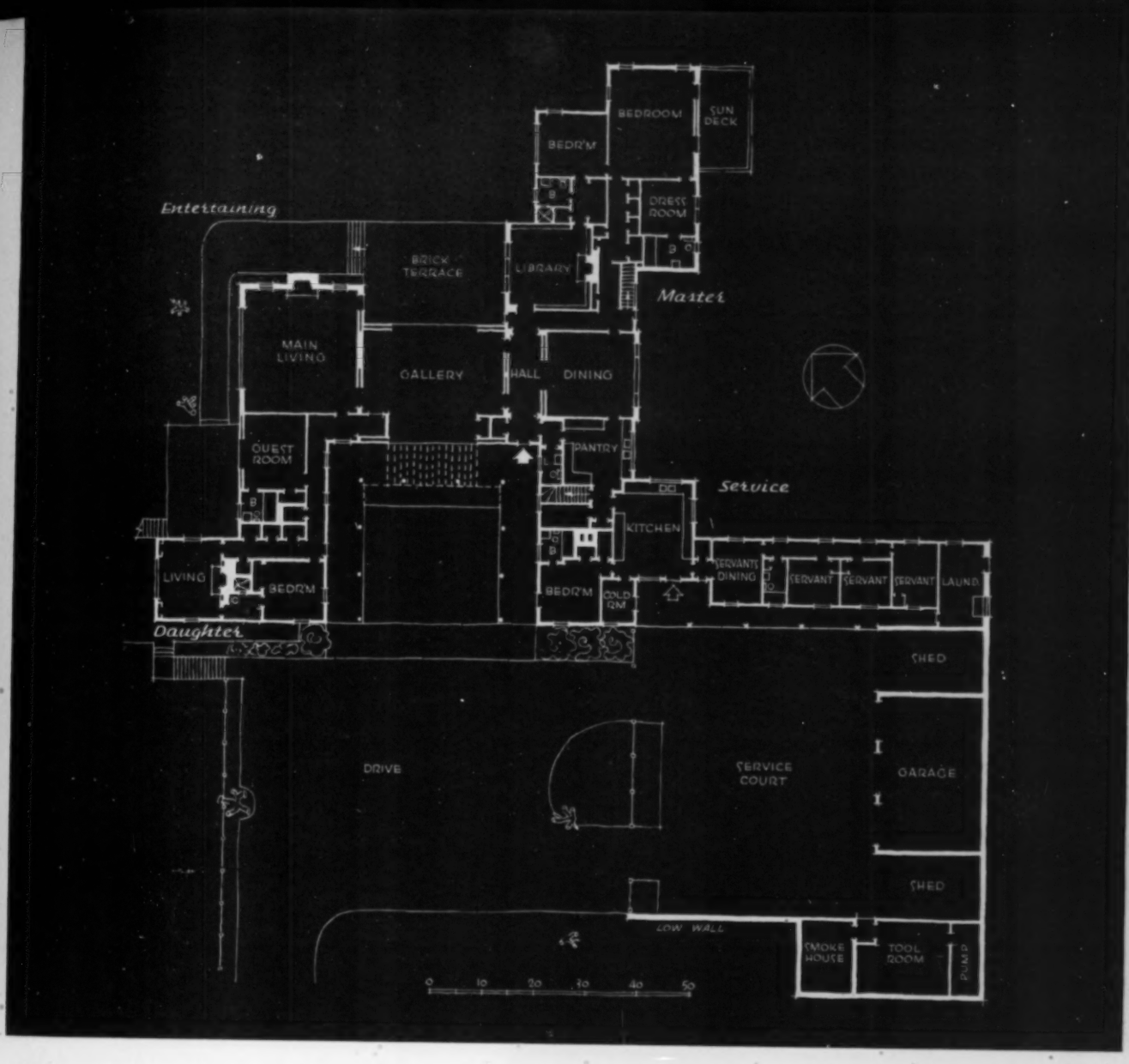
Residence of Mr. and Mrs. Harold F. Johnson, near Louisville, Ky.

James Kellum Smith, of McKim, Mead & White, Architect

D. X. Murphy & Bros., Associates

Two unusual features mark this hilltop-clinging house in the Kentucky farmland: the east-west axis of its main rooms, and the large gallery connecting the two wings. Both are due to the stipulation of the owners that full advantage be taken of the view up the Ohio Valley, to the north of the site, and that the cooling breeze from the river be ensnared in the hot summer months. A third requirement was provision for shutting off portions of the house in periods of disuse.

The architect's astute solution to this triple problem was the splitting of the house into two parallel wings, each with a view of the valley to the north, and the centering of guest and formal entertaining areas in the northern wing along with the apartment provided for the adult daughter of the family, not always at home. Dining room and kitchen were placed in the southern wing with the master bedroom suite and the library, which serves as the living room when the north wing is closed off. Connecting the two wings is a large gallery which can be thrown wide open either to the east or to the west, or both, to capture the breeze and draw it into the house.


BEDROOM
SUN DECK
BEDR'M
DRESS ROOM
Entertaining
BRICK TERRACE
LIBRARY
Master
MAIN LIVING
GALLERY
HALL
DINING
GUEST ROOM
PANTRY
Service
KITCHEN
LIVING
BEDR'M
BEDR'M
COLD RM
SERVANTS DINING
SERVANT
SERVANT
SERVANT
LAUND
Daughter
SHED
DRIVE
SERVICE COURT
GARAGE
SHED
LOW WALL
SMOKE HOUSE
TOOL ROOM
PUMP
0 10 20 30 40 50

Heart of the house is the large gallery between the two wings, which opens to a brick-paved terrace in the rear and to the welcoming, U-shaped entrance patio on the opposite side. Above: looking past the gallery toward the main entrance, immediately adjacent. Left and below: two views of the gallery facing entrance patio

Richard Garrison Photos

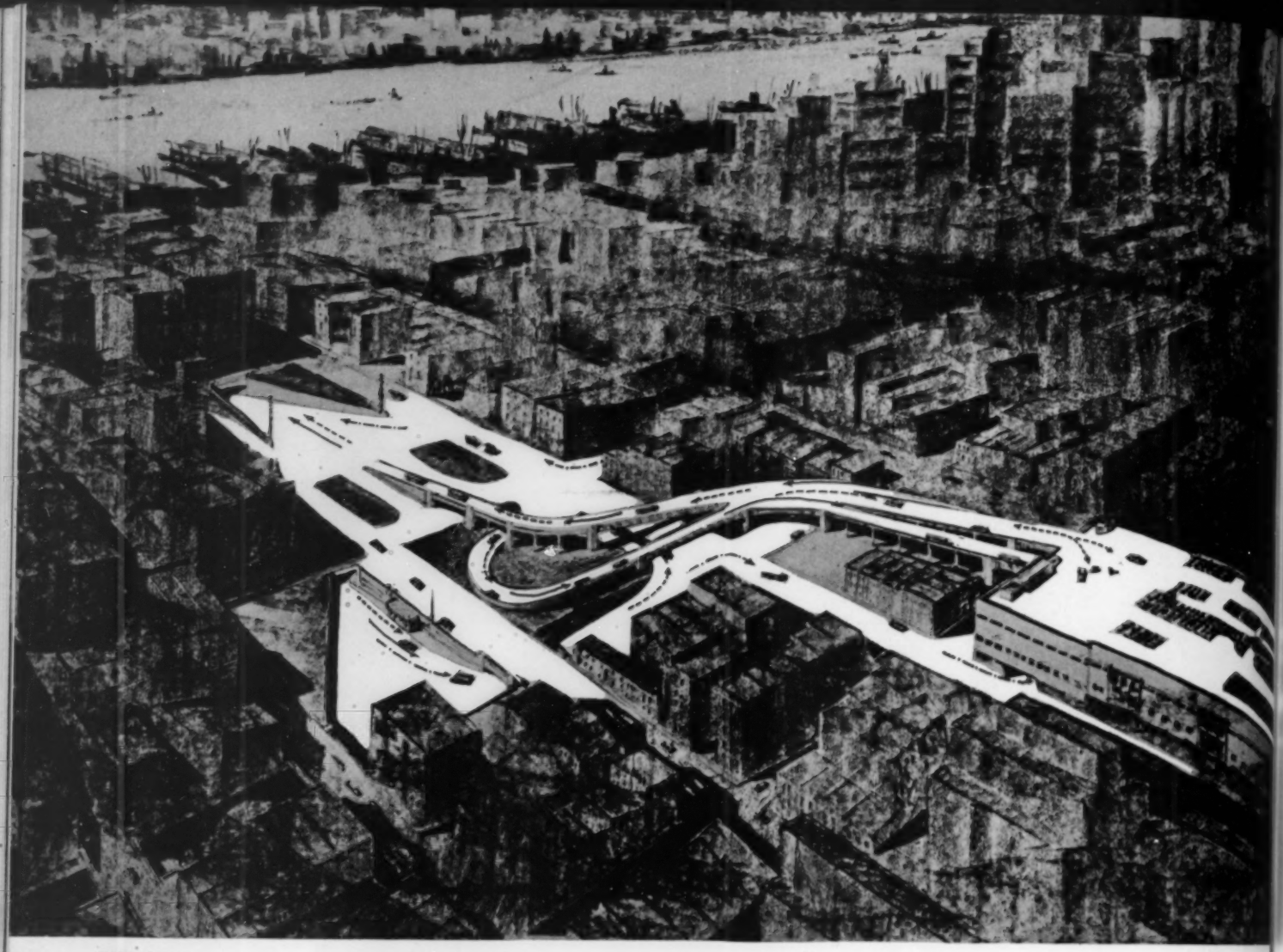
Ceiling and walls in gallery are redwood, floor is brick. Note the raised ceiling, which adds to feeling of spaciousness

Above: the rear of the house, with main living room to the right and library to the left of gallery. Right and below: the gallery at the rear, or terrace side. East and west walls of gallery consist almost entirely of glass doors rolling on floor and ceiling tracks. Door at left in photo below leads to main living room

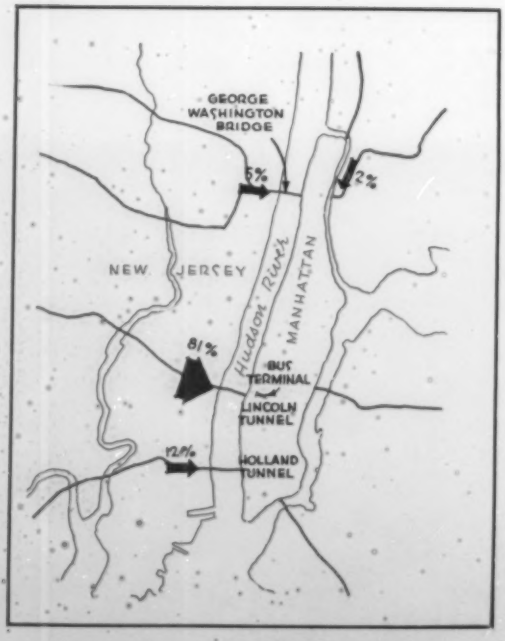
Rolling louvered shutters in combination with the glass doors permit the gallery to be breezy even in inclement weather

The front of the house has a traditionally Southern air, with its restrained detailing and its U-shaped service court (right in photo above). The library, below, serves as the living room when the north wing is closed off; walls are leather-covered. Opposite page: top, the kitchen has its own small entrance porch; below, opposite ends of the main living room, showing the marble-faced fireplace and door to the guest room hall (left). Interior walls throughout are plaster except in gallery and library; ceilings are plaster except in gallery

Richard Garrison Photos



William Brower



NEW YORK'S

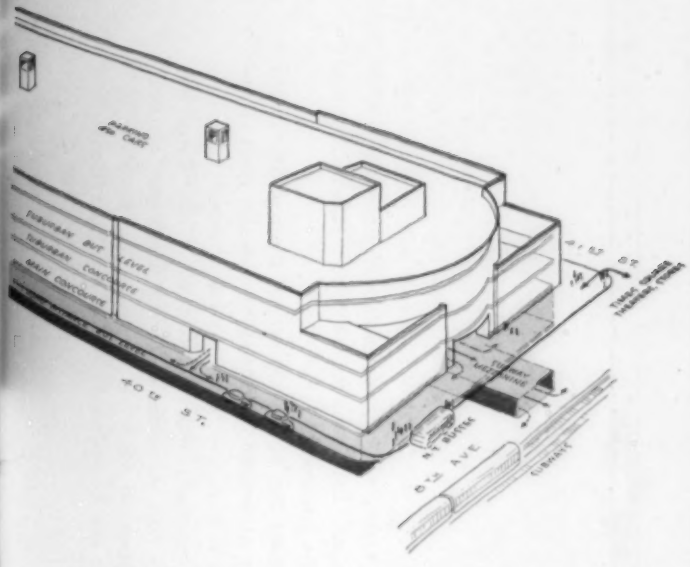
EVERY five seconds a huge inter-city bus will arrive at the new Union Bus Terminal planned by the Port of New York Authority for New York City. At peak capacity it is anticipated that there will be 750 bus arrivals and an equal number of departures per hour.

This mighty terminal under construction around the corner from Times Square will provide 60,000 daily travelers with direct access to the city's vast underground communication system and to surface transportation. It will be also within walking distance of the majority of New York City's largest department stores and theaters and many of its principal office buildings.

Suburban Traffic

Long Distance Traffic

Private Auto Traffic



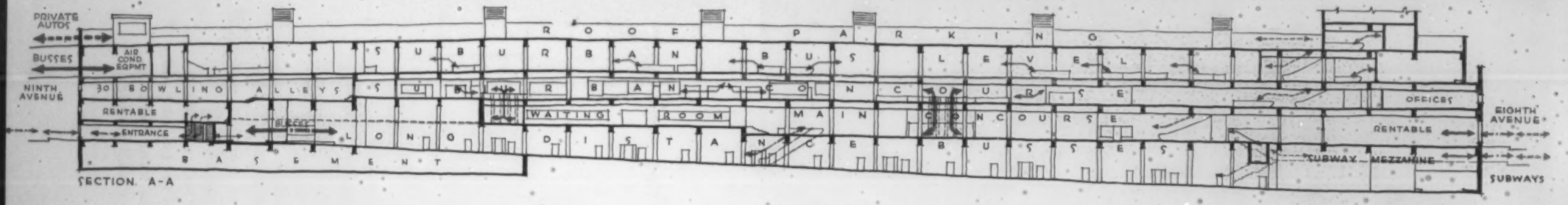
The Port of New York Authority

NEW UNION BUS TERMINAL

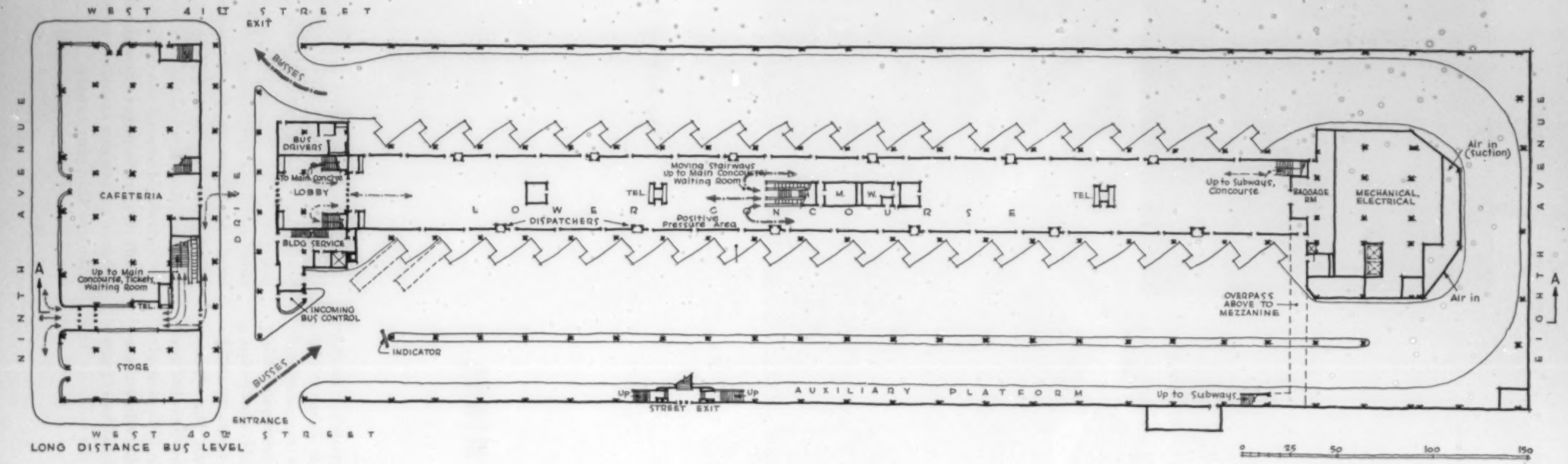
Connected by direct elevated ramp approaches to the Lincoln Tunnel, through which 81 per cent of bus traffic to midtown Manhattan passes, the new terminal will consolidate the movement of some 2100 whopping suburban and long-distance buses which daily manipulate and congest New York City's crowded streets to reach individual terminals scattered throughout the Times Square district. As a further measure of traffic relief the terminal will have a roof parking area for 450 privately owned automobiles. It is estimated that the elimination of traffic tie-ups will save commuters and shoppers from five to 20 minutes per trip.

The block long steel and brick structure will have four different floors with interior bus roadways and loading and unloading platforms on two levels. Long-distance buses, 15 per cent of the terminal load, will enter and leave the building at the Ninth Avenue street level. Suburban buses, 85 per cent of the load, will shuttle back and forth between the tunnel portals and the third floor level of the terminal by means of ramps.

Centralized around the concourses of the building will be all modern comfort conveniences for local and long-distance passengers including recreation facilities and an extensive shopping center.



SECTION A-A



LONG DISTANCE BUS LEVEL

Section shows vertical relationship of main elements of the terminal. Employees facilities and mechanical control are in the basement.

Incoming bus control flashes on the indicator at the entrance of terminal the number of dock that each incoming bus is to occupy. Electronic signal system keeps bus control constantly informed of docks in use. Buses will normally both discharge and load passengers at docks which open off the lower concourse. Company bus dispatchers are located in booths off the docks. Convenient moving stair access is provided between lower concourse and main concourse level. There is also a convenient entrance for long-distance travelers from Ninth Avenue and stairway access from the subway mezzanine level. Baggage is lifted from lower concourse to the main concourse.

The auxiliary platform along the outside wall will take care of special excursions, conventions, etc. Stairs from this platform lead directly to 40th Street, or waiting room, or subway mezzanine

The maximum practical upward incline of the bus ramp from the mouth of the Lincoln Tunnel to the terminal established the floor elevation of the suburban bus level at the Ninth Avenue end of the building. As this elevation was insufficient to provide proper ceiling height for the concourses underneath, the suburban bus level continues on an upward incline for some distance into the terminal.

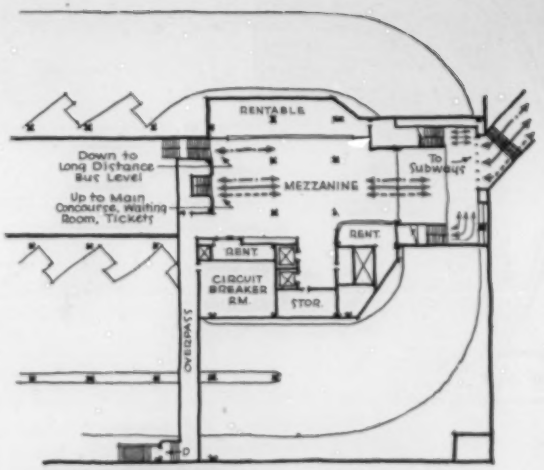
The existing elevation of Ninth Avenue, from which long-distance buses enter the terminal, fixed the elevation of the long-distance bus level at the Ninth Avenue end. Sections of the overhead main concourse level were cut away to provide head room for buses at entrance and exit points. As illustrated in section, the long-distance bus level slopes downward to provide bus headroom under the main waiting room, and continuing the downward incline, allows buses to swing under subway mezzanine to reach docks on the exit side of the level.

The steel structure of the terminal is of straightforward column, girder, and beam type with allowances for sloping levels and some eccentric column spacing due principally to bus circulation lanes. In the 800 ft. length of the building there are three expansion joints.

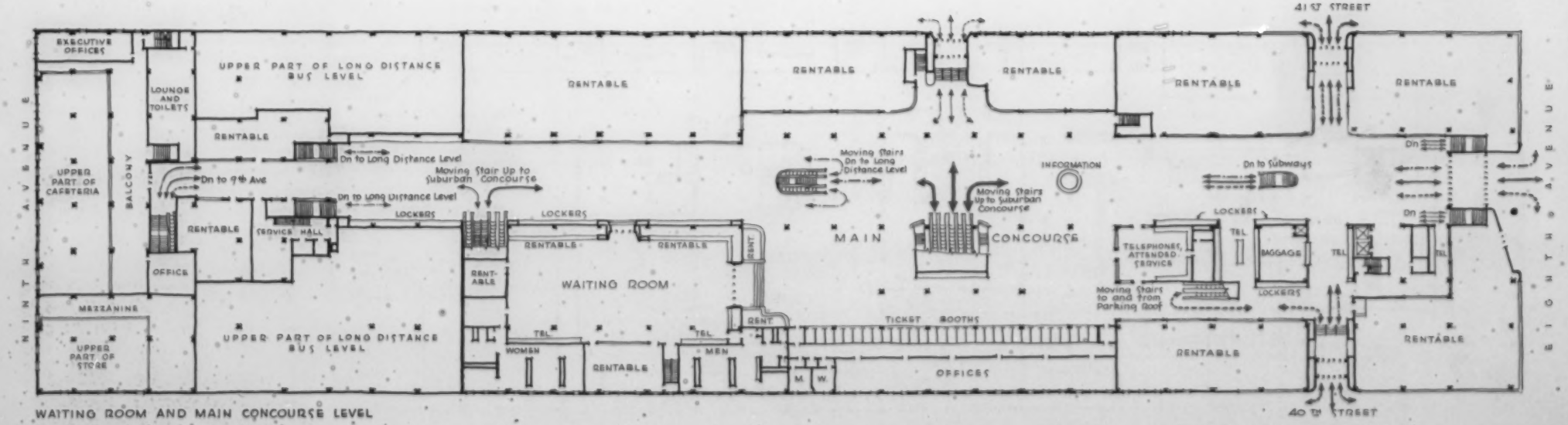
Road surfaces of the elevated ramps connecting the terminal to the tunnel entrance and exit will be heated to prevent the formation of ice.

The subway mezzanine is an integral and important element of the terminal traffic system as it provides direct access from the building to all of Greater New York

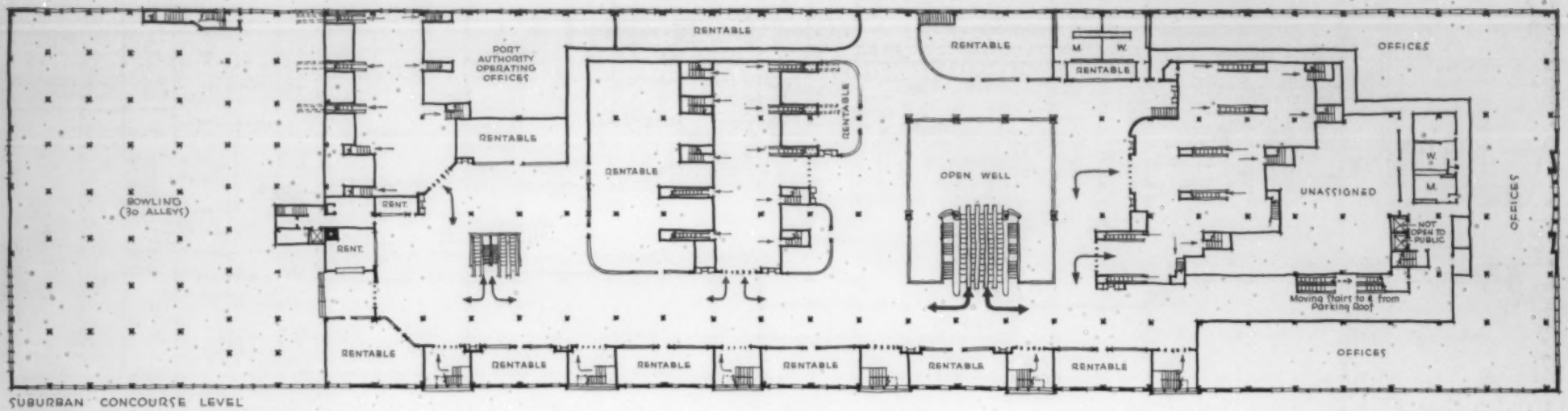
Main concourse, at the level of Eighth Avenue, 40th, and 41st Streets entrances, distributes travelers, commuters, and shoppers up to the suburban bus level and parking lot, or down to the long-haul level by means of 13 moving stairways and numerous auxiliary stairways. This level includes a large waiting room, ticket booths, information office, restaurant, shops and other conveniences and services for local and long-distance passengers



SUBWAY MEZZANINE



WAITING ROOM AND MAIN CONCOURSE LEVEL

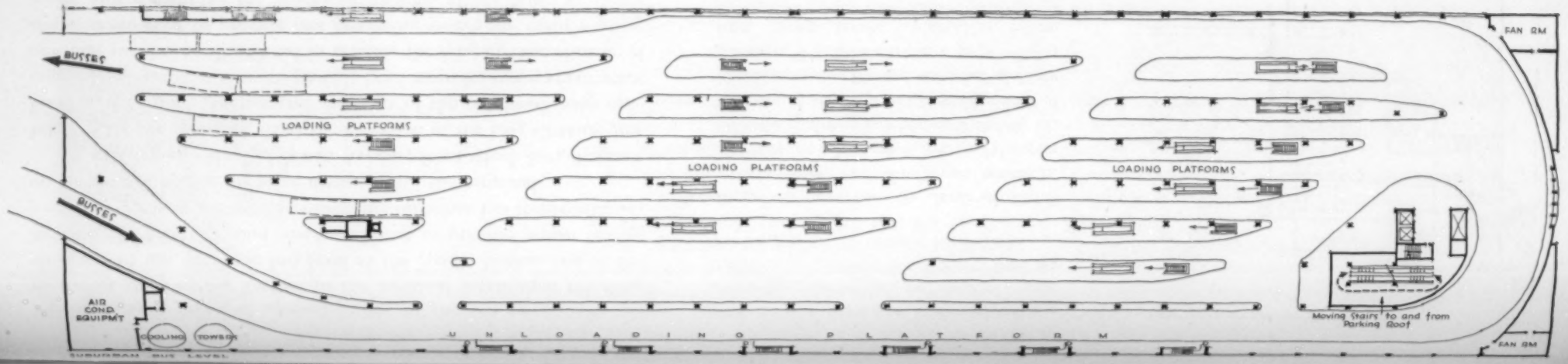


SUBURBAN CONCOURSE LEVEL

Suburban commuters and shoppers are separated into three major sorting areas on the suburban concourse level. 14 moving stairways and 16 stairs provide access from these areas to the short-haul loading platforms. On this upper concourse as in the main concourse there are numerous shops, and recreation facilities including a 30 alley bowling center. Moving stairway traffic to and from roof parking area is isolated from bus passengers.

Suburban bus traffic which comprises 85 per cent of the load of the terminal will enter and depart from the suburban bus level by means of elevated concrete ramps which connect directly with the Lincoln tunnel portals. 84 bus loading and unloading spaces have been planned. Loading will be done from the island platforms which are connected by moving stairways and stairs to the suburban concourse below. One long platform, the length of the building, has been provided for unloading traffic. Stairs lead directly from this platform down to the suburban concourse level. During peak unloading periods, however, island platforms with reversible escalators will also be used.

Buses will not be serviced in the terminal building, but batteries, air and water will be available for use in the case of emergency.



SUBURBAN BUS LEVEL

Particular attention has been given to the ventilation of bus loading levels. In the lower level, fresh air enters through bus entrance and exit openings off Ninth Avenue to be expelled from the roof through vents located under the subway mezzanine. In the upper level, continuous unglazed openings in both long sides of the building will afford the source of supply. Six huge exhaust units are located in the roof on the long axis of the building. Concourses opening to the loading areas will be "pressurized" with fresh air to prevent the entrance of exhaust fumes.

Electronic indicators will advise the incoming long-distance bus control which docks are in use. An announcing system for bus arrivals and departures will have outlets at strategic points.

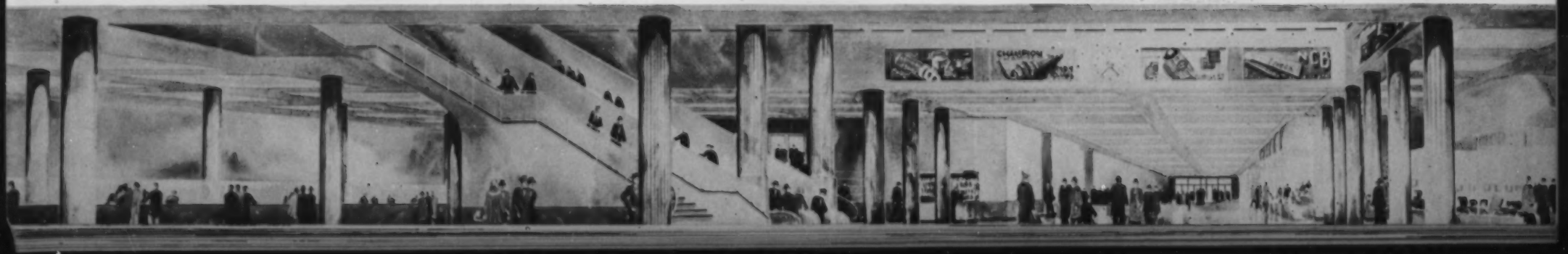
Interior finishes reflect the careful consideration given to economical building maintenance. Waiting rooms, concourses, etc., will have marble wainscote 4 ft. 6 in. high with enamel steel panels above to ceiling. Wearing surfaces, hand rails, trim, and concourse column finish will be of aluminum. Terrazzo floors will be used with non-slip aggregate on sloping surfaces. Ceilings are of suspended acoustical metal pan units with lighting fixtures set flush. Stairs will have terrazzo treads with abrasive strips. The building exterior will be of brick with a 5 ft. granite wainscote and limestone trim.

The importance of rentable areas as a source of revenue has been carefully studied and emphasized in the working out of the plan. All available space has been developed for concession use. As in any good merchandising system, concessions have been played up — made more attractive and more easily accessible — where pedestrian traffic is heaviest. This has never been done, however, to the inconvenience of the traveler, but rather from the standpoint of providing him with extra service, and added time-saving facilities. Shop fronts, restaurants, magazine and shoe shine stands will all be designed and planned to harmonize with interior design and decoration.

Times Square skyscrapers provide an impressive silhouette as excavation work for the terminal foundations proceeds. The Port Authority located and renovated apartments for dispossessed families

Sketch of main concourse shows escalators leading to suburban concourse level. Provision has been made for air conditioning waiting room and rentable areas. Individual vending machines will be recessed flush with walls and finished in special harmonizing colors

William Brower



SHOPPING CENTERS

ARCHITECTURAL RECORD'S

As a building type the shopping center is still in the experimental stage. Yet it already has inspired a typical conception: a group of one- or two-story buildings adjacent to a large parking area. The stores on the ground floor, small and varied, cluster around a supermarket and a drugstore, sharing the traffic which these can be depended upon to promote. The bigger centers will include also a movie theater, a "5 and 10," a bank, a restaurant, perhaps also a branch department store. On the second floor (if there is one) will be offices for doctors, dentists, lawyers, and other professional men.

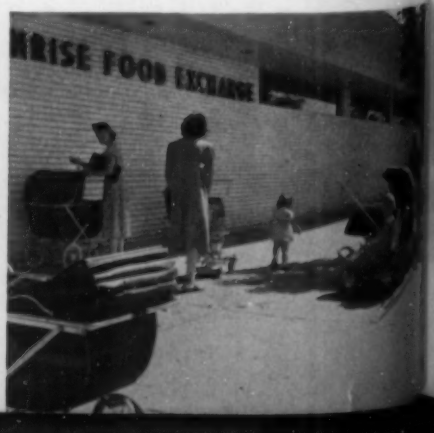
This group of stores and offices will often be somewhat withdrawn from the highway; they may even turn their backs upon it, as though spurning the automobile which jogged them into existence (although they will pamper the automobile which comes bearing customers — the recommended ratio of parking space to store space becomes larger every year).

In 1925 automobiles in the U. S. ran up 200 billion passenger miles, more or less. In 1940 the figure was 500 billion. Combine these facts with the depression and the urge to lower distribution costs, and you have the cash-and-carry supermarket, which the average housewife visits three times a week, taking the goods home in her car.

The bus has replaced the trolley car as the favored form of urban transportation. In contrast to the rigid armature of the trolley lines with their costly tracks, bus routes can be quickly changed, adapted to the creation of new communities. And whereas the trolley car certainly encouraged strip development, it may be claimed that the bus encourages satellite towns (just as the private automobile gives birth to the independent shopping centers isolated except from roads). The satellite towns in their turn encourage the planned neighborhood shopping center which has now come to be considered an essential amenity in all large new housing developments — particularly since developers have come to realize what profits may lie in store leasing.

The more widespread and obvious result of the automobile's popularity is the ring of inchoate suburbs which already scatter out like a shot pattern from all large towns, in exploitation of lower-cost land. This is typical shopping center and branch department store territory, the lower land cost justifying sprawling one- or two-story buildings and large parking areas.

Use of the automobile, however, by the suddenness of its growth, has set increasingly restricted limits on its own usefulness. Its convenience depends less upon distance than upon traffic con-



BUILDING TYPES STUDY NUMBER 152

By Bruno Funaro and Geoffrey Baker

This study is based on the research of Bruno Funaro, A.I.A., as McKim Fellow, Columbia University, 1948–49. It has been prepared by Bruno Funaro and Geoffrey Baker who are at present collaborating on a book covering the same subject

gestion. The trading area of any store group has changed not only in scale but in shape also. It is no longer a simple circle of so many miles radius. Based on driving time it becomes an irregular cookie shape. In most of the ambitious shopping centers now in the planning stage, considerable importance is given to a site easily accessible from a number of major, fast-traffic highways.

Side by side with the plans which depend mainly upon automobile traffic are others based on the traffic promoted by an existing transportation center such as a railroad station or long-distance bus terminal (with, however, a great deal of parking space added to serve those arriving in their own cars). Many plans have also been drawn for making the existing downtown shopping areas more attractive by the provision of extra parking space. Because of the number of vested interests involved, such schemes probably will remain pigeonholed for many years to come, except in some smaller towns where the investments are not so large, the pressure against change less strong (see pages 114, 115).

All types of shopping center envisage a certain amount of control, which is normally enforced by all the stores being in one ownership. Each store depends upon the landlord to see that he is subjected to no more than the small amount of fair competition which attracts the customer. This, combined with the proximity of traffic-getters such as supermarkets and department stores, makes location in a shopping center particularly attractive to the small merchant. In return for a slightly higher rent (for he is subsidizing the traffic-getters) he is guaranteed traffic, prestige, and a certain stability which Main Street cannot always provide.

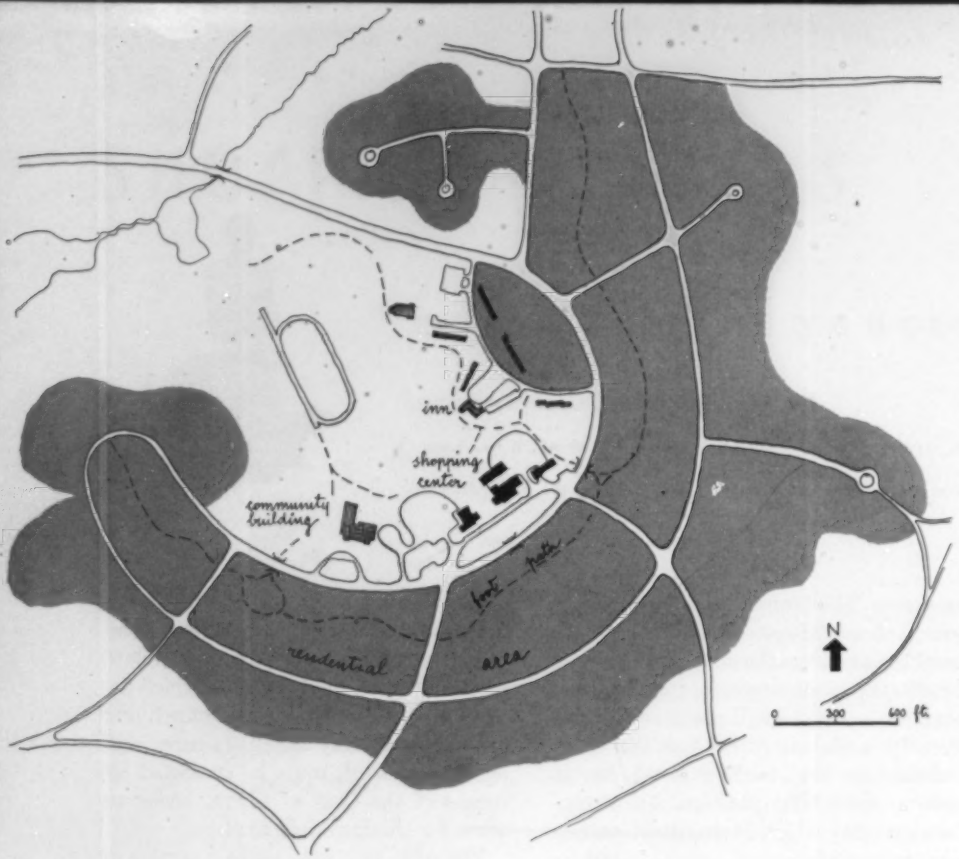
Every privately promoted shopping center will have profit as its *raison d'être*, just as every store which rents space will have to be convinced that it is a good spot to make a profit. So, in order to sell his tenants, and perhaps convince himself too, the promoter must build up a statistical picture of his prospective customers.

He will want to know how much *Buying Power* this new center may hope to tap. First he must decide the total income of the area from which it is hoped to draw trade. Yardsticks commonly used are distribution of income-tax returns and non-commercial telephones, proportion of homeowners to non-homeowners, number of servants, etc. To discover the *net* Buying Power, subtract from this total income all that is already committed to others — e.g., rent to the landlord, and business already going to existing stores. All this figuring is clouded by almost endless assumptions and shading. For example, it is usually necessary to work with 1940 census figures (in most cases the latest available), and these can usually be brought up to date only after many modifications, which depend for their correctness on hunch and experience. Finally the 1940 figures, and any others used, must be corrected by means of the Cost of Living Index to allow for changed dollar values.

The next step is to make a survey of *existing stores:* type, quality, sales volume, convenience (location, and amenities such as parking).

Next it is necessary to calculate a *radius of attraction*. This will be based on such considerations as driving time, public transportation, walking distance, shopping habits, etc.

From these facts the promoter will be able to judge what form his center should take and where it should be placed. He should be able to judge what type of stores will be most successful there, how many, how large; and what other types of enterprises should be included — a theater perhaps, a restaurant, offices. And the nature of his tenants will give him some idea of the turnover to expect in the parking area, which in turn will govern its size. And if he is wise he will remember also (even if he doesn't admit it) that all these elaborate calculations can be thrown out of balance by some rival promoter starting another center nearby.



Left:
Hemmed in on three sides by residential zones, with a community recreation park completing the encirclement, the store group in Greenbelt, Md. (built by the Resettlement Administration, 1936) makes no attempt to attract custom from those outside the community. But it is at the center of a convergent pattern of roads and footpaths (with underpasses) which help to channel the shopping habits of those within the community

Right:
A neighborhood center, serving some 2000 families, this modern version of the traditional village green includes a swimming pool, a children's playground, and a community building with restaurant and bowling alleys, in addition to a row of stores. Embedded in the middle of a residential community, a center such as this does not expect to draw passing trade from a main highway. Levittown, Long Island, N. Y., developed by Levitt & Sons

The suitability of any site for a shopping center should be judged under three main heads:

Accessibility—by private car, by public transportation (bus, trolley car, subway), on foot from nearby houses.

Zoning—of the site itself and of adjacent property.

Topography—the shape, size, contours and physical features of the plot.

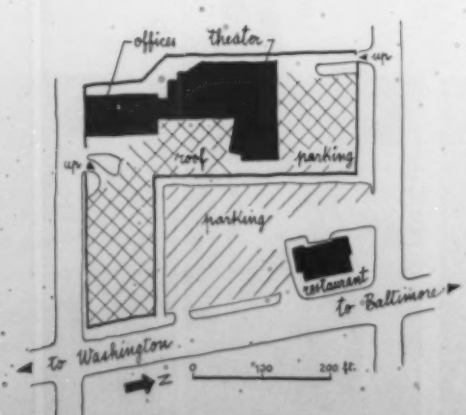
ACCESSIBILITY

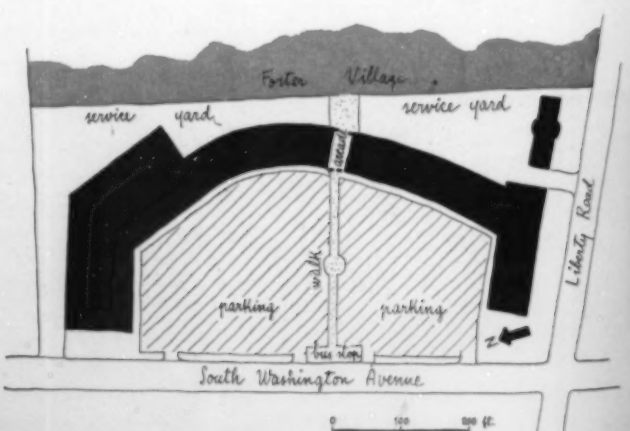
Shoppers will arrive on foot, by private car, and by public transportation. Except in densely populated areas foot traffic is of small importance in the total traffic which any center can hope to attract. Local conditions, such as distance from residential and business areas, preformed habits, the type of stores included in the shopping center, and the wealth of prospective customers, all influence the manner in which these reach the new group of stores.

In deciding the site itself and the position of stores on that site, the aim should always be to make it as easy as possible for customers to reach these stores, bearing in mind local shopping habits. For example, stores on one side of a major thoroughfare might seem to

Alongside a main highway, this shopping center (not yet completed) at College Park, Md., includes a separate restaurant, right on the road, to pull in long-distance travelers. The plan of this center is typical of the L-shaped type with front parking which has already proved successful in the Washington area. This one has some additional roof parking (see page 118). Architects: Berla & Abel

Funneling pedestrian traffic through a central arcade between a large group of two-story apartments (Foster Village) and a main road bus station, this group of stores at Bergenfield, N. J., with its large area of front parking, should also attract shoppers coming in automobiles from neighboring communities. The curve of the building increases store frontage and encourages window shopping. Architect: Alan Wood Fraser

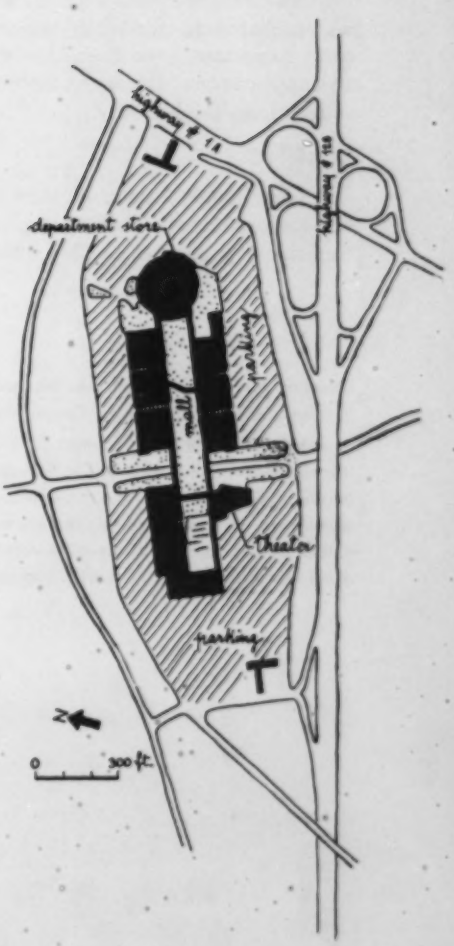




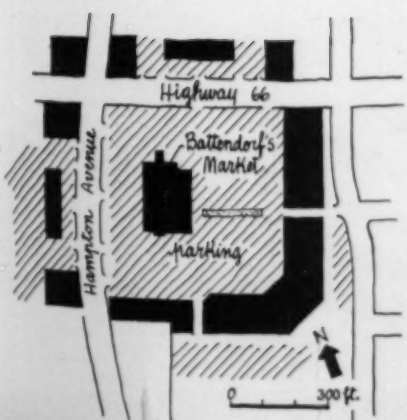
Thomas Airviews Photo

local customers much more easily reached (and therefore more popular) than competing stores almost directly opposite. Location near a commuter railroad station, near a bus stop or a subway station, may become an important factor in the success of a new center. Anything that promotes traffic is popular with a majority of the smaller store owners.

In addition to the local shoppers there are the long-distance automobile travelers who want to stop for a meal, or to fill up at a gas station. They may also be induced to do some impulse buying at an adjacent group of stores. Traffic counts can give some inkling of what such trade could amount to, but other factors, such as the side of the highway on which the stores are placed, and their



Right:
Turning its back to the highways by which its customers will arrive, this proposed center at Beverly, Mass., in the Boston suburban belt, is encircled by parking space (for 3000 cars), with the store fronts facing on an interior pedestrian mall. At the clover-leaf intersection of Highways 1A and 128, the center would be within 15 minutes driving distance of almost any point in the densely populated Boston suburban area, reaching out as far as Gloucester, Ipswich, Marblehead and Wakefield



Left:
Enclosing the intersection of Hampton Boulevard and Highway 66 within its store-lined courtyard, Hampton Village shopping center is the result of 20 years work in site assembly and development by realtor Harry Brinkop. In the growing suburban area southwest of St. Louis, Mo., it is only 6 minutes drive, or less, from five other major highways. There is parking space for 2500 cars. The convenience and pulling power of the center already has been demonstrated by Bettendorf's Hampton Village Market, housed in the central island building. Last year this supermarket grossed more than $3½ million. Architect: Preston J. Bradshaw

Ben Kocivar Photo

Rehabilitation of an existing town center, though common in the bulky reports of planning experts, is usually forced into existence only at the impellent urge of some emergency or disaster. In Mount Kisco, N. Y., it was the need of eliminating two grade crossings which caused the New York Central Railroad to move their tracks (and the railroad station) about 200 ft. northwest. This in turn meant the demolition of many of the town's principal store buildings. Several of the merchants about to be displaced picked upon the area southeast of the present station as most desirable for expansion of the business center; and a series of three-way conferences between the staff of the Northern Westchester Joint Planning Program,

NORTH

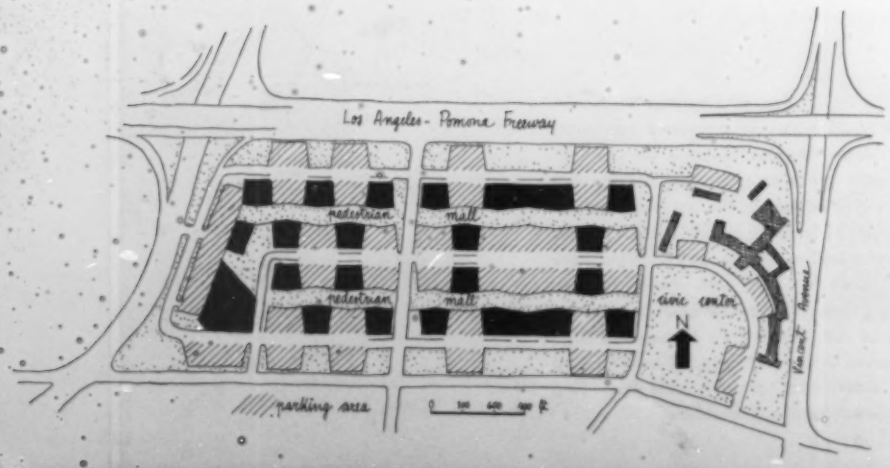
relative distance from competing stores, will probably be far more important; more important even than the attractive appearance of the stores themselves as seen from the highway.

ZONING

A new shopping center must be fitted into the community zoning pattern. The traditional pattern of shallow business zones which run the length of major highways is being abandoned by forward-looking zoning ordinances. Such zoning encourage ribbon development (now generally frowned upon), and gives insufficient depth for off-street parking. Moreover it has been found that too large an area has usually been allotted to the business zone, when compared with an estimate of the number of stores which the surrounding community could be expected to need and be capable of supporting.

The tendency, therefore, in amending zoning controls is to confine the business areas to a limited number of strategic spots, with special regulation of off-street parking, advertising signs, etc. The aim always should be to make zoning controls flexible enough to allow

Designed for gradual expansion, this grouping of stores and community buildings for the town of West Covina, Calif., envisages a possible growth of population in the next 50 years from 2500 to a maximum of 55,000. It is hoped that it may be possible, through zoning regulations agreed upon by the property owners, to guide shopping center development into the plan shown here, with alternating pedestrian malls and vehicular service roads, and large parking areas between the store blocks. At present the area shown is still farmland. Architect: Robert E. Alexander

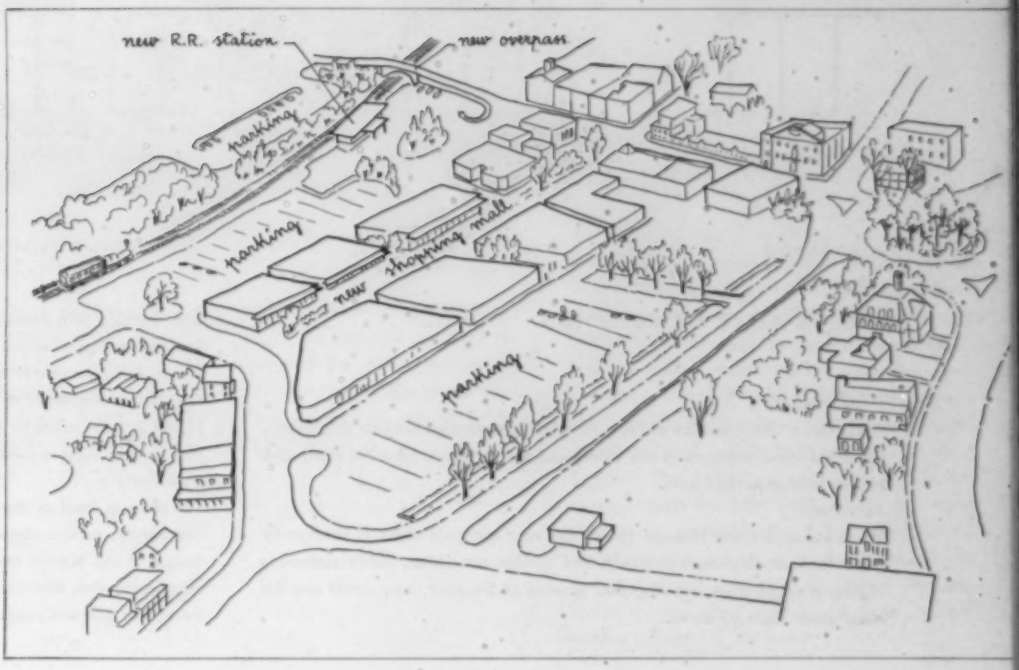


High land values in downtown shopping districts will often make multi-deck parking garages economically justifiable. The open-sided decks here are connected by ramps within the building perimeter. This garage is across the street from the department store which it serves. Connection between store and garage is underground by passages for pedestrians and conveyor belts for freight and packages. Customers returning to their car can pick up all their purchases at one time. Foley's, Houston, Tex. Architect: Kenneth Franzheim. Raymond Loewy Associates, Retail Planners & Designers

Paul Peters Photo

(Henry Fagin, director) the Mount Kisco Planning Board and the store owners, has brought forth the scheme of development pictured at right.

The main feature of the plan is a new shopping center on South Moger Ave. with the street itself converted into a landscaped pedestrian mall and extensive parking areas provided at the rear of the stores. Existing conditions are shown on the opposite page. A somewhat similar scheme was proposed some years ago to rehabilitate the shopping center of Rye, N. Y. Mount Kisco is depending upon agreement among the property owners concerned (fortunately few), with public support and realistic zoning rules, to guide future development according to the agreed plan



for changing needs. However, the establishment of a new, major shopping center, with some 30 or 40 different stores and a theater, will almost always require extensive amendment of the local zoning ordinances.

TOPOGRAPHY

The shape and the size of the site always interpose themselves as modifying factors between the developer's program and the completed shopping center.

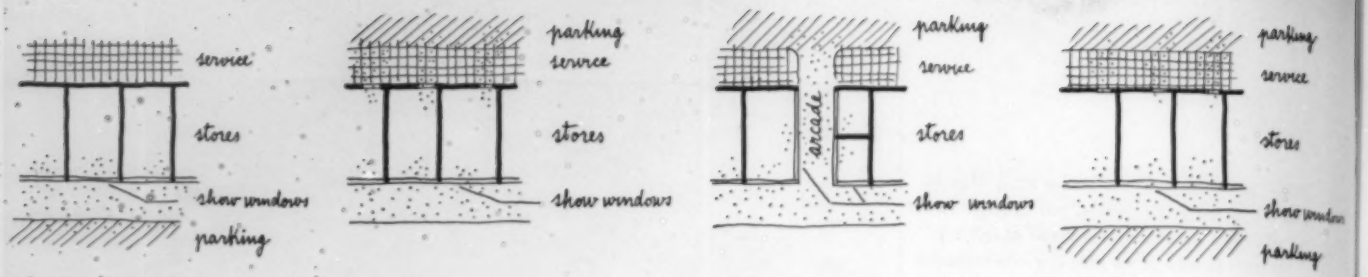
Is the site big enough to accommodate the number of stores (and the necessary amount of parking space for so many stores) upon which the developer's program is based? If not, is the land valuable enough to justify a multi-level plan, with roof parking, service tunnel, or the like?

Does the shape of the lot allow it to be developed economically? If it is not flat, can its contours be economically developed? How are the soil conditions, particularly for bearing and drainage?

Most of such questions can be answered only after quite extensive preliminary investigation, but it is never too late to abandon a site which cannot meet all foreseeable needs.

An irregular, sloping site will allow a two-level store with both levels directly accessible from a parking lot. The penthouse story is used for offices, storage, employees' dining room. This extended, rambling type of store (which suburban land values will justify) is typical of the country club atmosphere which New York's Lord & Taylor has so successfully expressed in its branch stores. This one is at Eastchester, N. Y., near the plushy, high-income, commuter suburbs section of Westchester County. Architects: Starrett & Van Vleck. Raymond Loewy Associates, Designers

Gottscho-Schleisner Photo



FRONT PARKING REAR PARKING REAR PARKING WITH ARCADES SPLIT PARKING

PARKING AREAS & CIRCULATION

Front Parking
Customers at front, service at rear; completely separates the two circulations. The front show windows of the stores are set far back from the road and hidden behind parked cars.

Rear Parking
When customers are allowed to use the rear entrance there is necessarily some confusion between customer and service circulation. Many customers visiting a single store, entering and leaving at the rear, may never see the other store show windows.

Rear Parking with Arcades
The customer must make some detour in order to reach the store front entrance (rear entrances are supposedly reserved for service). By funneling this traffic, the arcades become very valuable display space. This sort of layout is most suitable for leisurely shopping (e.g., women's fashion goods) and is often used in combination with interior pedestrian malls.

Split Parking
The area in front of the stores is useful for quick in-and-out shopping (e.g., drug store, service stores), that at the rear for longer visits and overflow space. In this scheme the customers are sometimes allowed to use the rear store entrances, sometimes they are forced to detour through arcades between the stores to reach the front entrance.

SITE PLANNING

The most important influence on the site plan of shopping centers is circulation — of pedestrian shoppers, of their cars (parking), and of freight service for the stores.

The most practical solution, in our age of open planning and romantic merging of space, still remains the old-fashioned one of customers entrance and display windows on one side (the front), the service entrance and loading docks on the opposite side (the rear). An uneven site (usually rejected by store developers) may result in a special multi-level arrangement; but these are rare. Though the small stores in any center continue to have the traditional front and rear, the fronts may not face the highway. They may be turned around to face on a quiet interior court, landscaped and free of auto traffic. The service entrances will then front the highway.

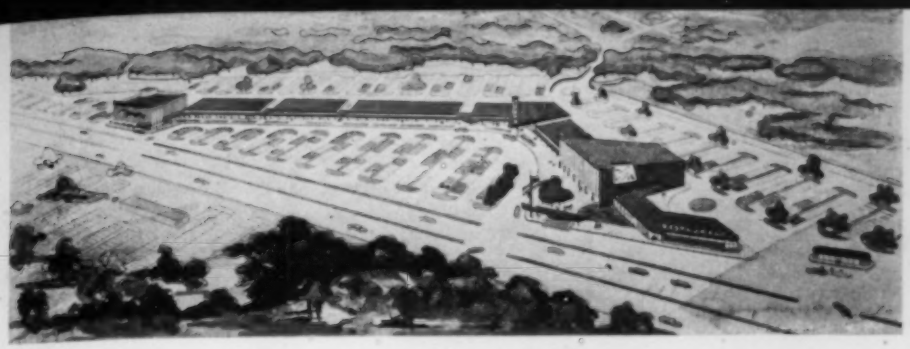
As there is generally more space allotted to parking than to buildings, the parking area becomes the dominating feature of a shopping center site plan. It is an intermediate stage between the high-speed highway circulation and the pedestrian circulation within the stores. It may be placed in front of the stores — even though this front may not face the highway; this will be referred to here as *front parking*. Or it may be at the rear of the stores — even though such parking areas may adjoin the highway; this will be referred to as *rear parking*. The common compromise plan, with some front and some rear parking, will be known as *split parking*.

Front Parking is especially suitable for the fast "in-and-out" shopper. Many drugstore chains consider it almost as essential as a corner site.

It gives no flexibility between low and peak shopping hours. If it is planned to handle peak loads (according to the Urban Land Institute peak periods represent 15 to 20 per cent of the total number of store hours each week) it must be so large that the store fronts are set too far back from the street for normal convenience and display. The

Aerial Photo Service

Front parking extended by bending the line of stores and parking back into a deep and somewhat narrow courtyard at right angles to the main highway. For passing traffic a gas station is provided right on the highway, but otherwise the main road frontage is used for access rather than display. The rear (service) entrances of the stores which front the road at the left are hidden behind a high wall and a band of evergreen planting. The center is protected on three sides by residential development and a school. On the fourth side, across the highway, is golf course property. This Highland Park shopping center at Dallas, Tex., has proved so successful since Hugh Prather started it in 1931, that its plan (Fooshee & Cheek, architects) has been widely studied and followed, notably in the much publicized Bellevue Center, near Seattle, Wash. (opened in 1947)



Above:
Split parking is successfully used in this projected center on Route 4 near Hackensack, N. J. A restaurant and gas station are set directly on the highway; the other stores curve back to allow more frontage and sufficient front parking for normal business. The overflow parking area behind is connected with the store fronts by several pedestrian arcades which pierce the store block. Notice that the island walkways in the parking lot are at right angles to the line of store fronts, so that they lead the shopper directly to the stores. Architects: Kelly & Gruzen

Below:
Rear parking (with a single line of front parking for the quick in-and-out shopper) is shown in this plan of the shopping center now building at Baldwin Hills Village, Los Angeles, Calif. The site is a strip 318 ft. deep between a main through highway (La Brea Avenue) and the residential area. The major stores are 125 ft. deep and have a rear entrance for customers from the parking lot. The minor stores, only 65 ft. deep, are sandwiched between, thus allowing for a series of screened service courts to serve both major and minor stores. The pedestrian way which bisects the center will later be extended by an overpass to connect with a projected additional shopping center on the other side of La Brea Avenue. Architect: Robert E. Alexander

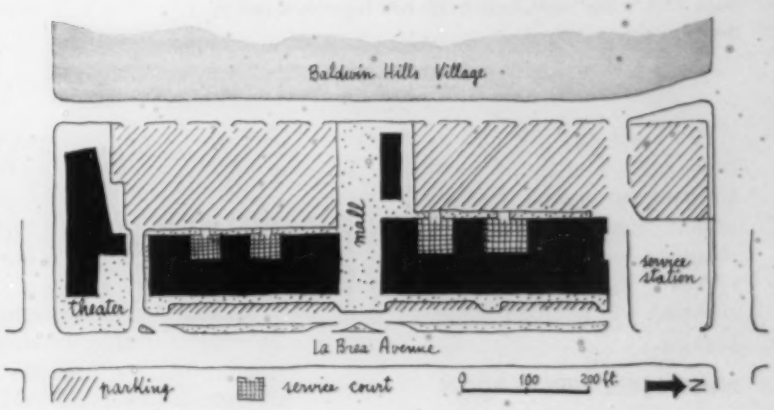
passer-by on the highway is separated from the store fronts by a concealing mass of parked cars, or by a bleak expanse of empty pavement.

Split Parking overcomes these objections by providing a limited amount of front parking, an additional parking area for peak loads at rear or side.

Rear Parking must be divided into two categories, according to the route which the shopper takes in walking from parking space to stores and back again.

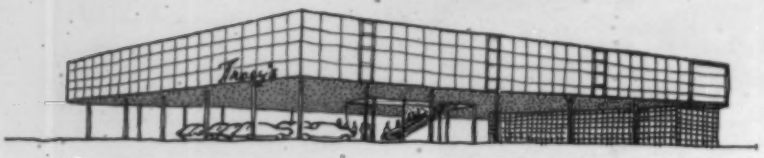
When shoppers enter through the rear of the store there is confusion between customer circulation and service circulation. The customer enters the store through a back door which is usually cluttered with supplies and empty crates. Window shopping is not encouraged, for many of the customers may never see the store front display, as they walk directly in and out of the rear entrance of a single store. Two exits complicate the layout and supervision of any store, especially self-service stores with check-out stations.

To overcome such objections a second category of rear parking plans keeps the rear entrances reserved for service; customers must walk through arcades cut between the stores and thus reach the front entrance. Such intensive funneling of traffic through these arcades makes them very valuable for the display and sale of impulse goods. Customers, however, tend to resent the detours to which they are subjected, and there is usually much undercover use of rear service entrances for greater convenience in going to and from parked cars.

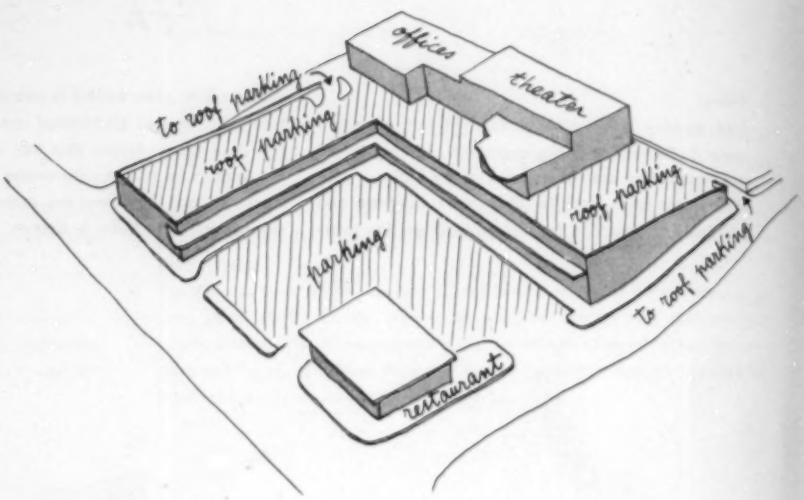


Below:
The rear entrance. Who's it for? Customers? Or freight and garbage? In most centers it is supposed to serve both purposes. Result: it serves neither as well as it could.

This is the customer. She can keep a store in business or put it into the bankruptcy court. Isn't it worth a little thought to avoid such shabby inconveniences?



Above:
Ground floor parking, with the whole building raised on stilts, enables the customer to go to and from her car under cover. Escalators could give quick and easy access to the stores above, and gravity chutes could be used to bring packages from the stores to pick-up points. Architects: Ketchum, Giná & Sharp



On a sloping site roof parking may become economically justified, particularly when it is possible to find a corner plot or a whole block with public street connection of upper and lower levels. The result in a case such as this (based on a design by Berla & Abel, architects, for College Park Shopping Center, Inc.) is that very little of the valuable site is wasted on ramps. On a flat site the ramps will be much longer and more wasteful of space (cf. page 130). In most cases, as here, the roof is supplemented by ground parking areas

Rear parking with arcades is especially suitable in site plans with a central landscaped mall. Such centers will usually be designed for more leisurely shopping (e.g., for fashion goods), as opposed to the quick, convenience shopping which is best served by front parking.

MULTI-LEVEL CIRCULATION

To overcome the rigid limitations of front (for customers and display) and rear (for service), customers and service may circulate on different levels. This may be of great help to the conscientious designer, but the decision must always be based finally on the answer to that standard question: Is it worth what it costs?

A service tunnel will segregate service and freight traffic, leaving all above ground free for customer circulation and private automobile parking. A tunnel is usually ruled out by its considerable extra cost, but may be justifiable where it is important to keep both front and rear of a store free for customers (see page 127).

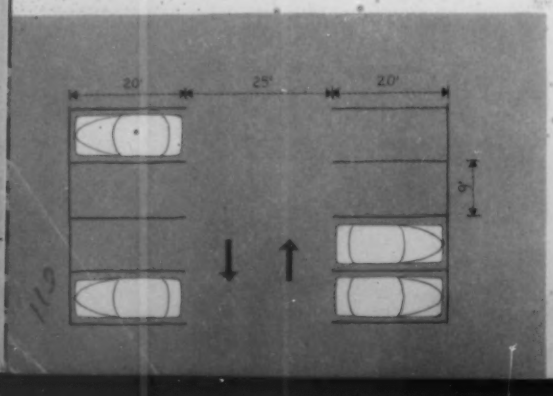
Roof parking has always had a strong appeal to the modern designer for its three-dimensional circulation, and for its "functionalism" in putting to use an area which might otherwise appear wasted. Actually the economic facts of roof parking, and its effects upon circulation, have limited its use to a few special cases.

The necessary ramps leading from street level to roof are expensive to build

These diagrams are based (with permission of the American Automobile Association) on the AAA *Parking Manual*, but with dimensions slightly increased to satisfy the special conditions found in shopping centers. A stall size of 20 ft. x 9 ft. has been chosen as roomy enough for boarding the car with large bundles.

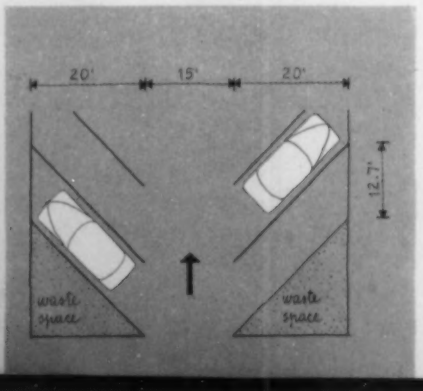
292 sq. ft. per car **149 cars per acre**

90 degree parking is the least wasteful of space. It is recommended where land is expensive and the rate of turnover does not justify angle parking. It is used in almost all attendant garages. The large aisle required for the 90 degree turn permits two-way circulation



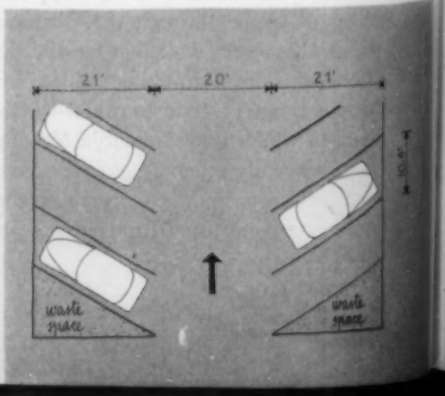
350 sq. ft. per car **124 cars per acre**

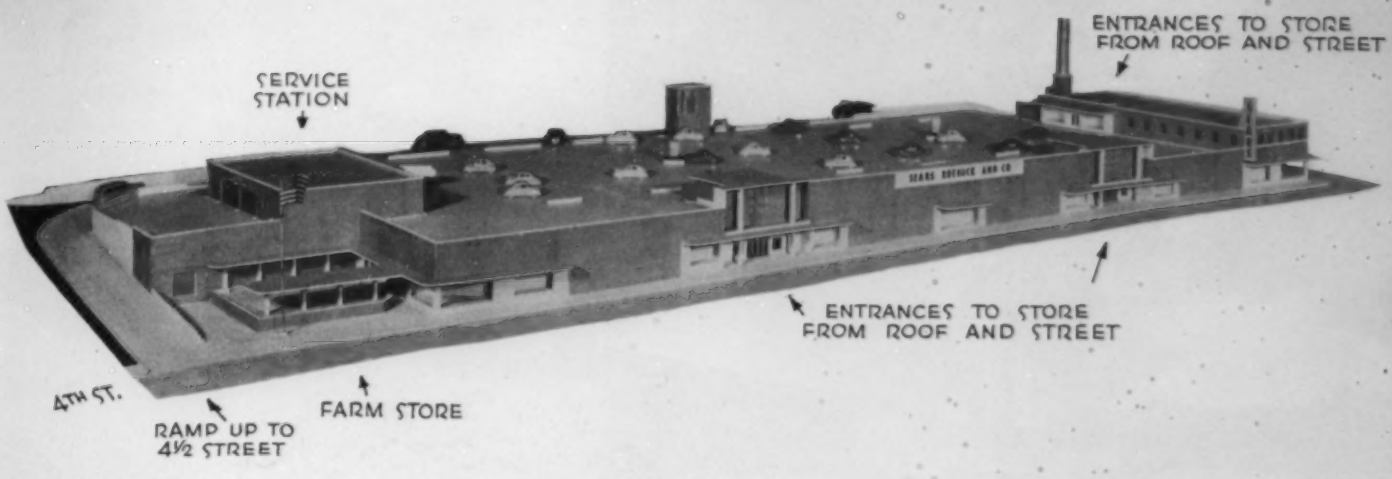
45 degree parking is not as economical in its use of space as the 90 degree pattern; but it is much easier to get in and out of the stalls



322 sq. ft. per car **135 cars per acre**

60 degree parking saves about 10 sq. ft. per car over the 45 degree arrangement, but needs more overall width because of the wider aisle. It is often used on plots too narrow for 90 degree parking, or where turnover is high and convenience in entering and leaving is important



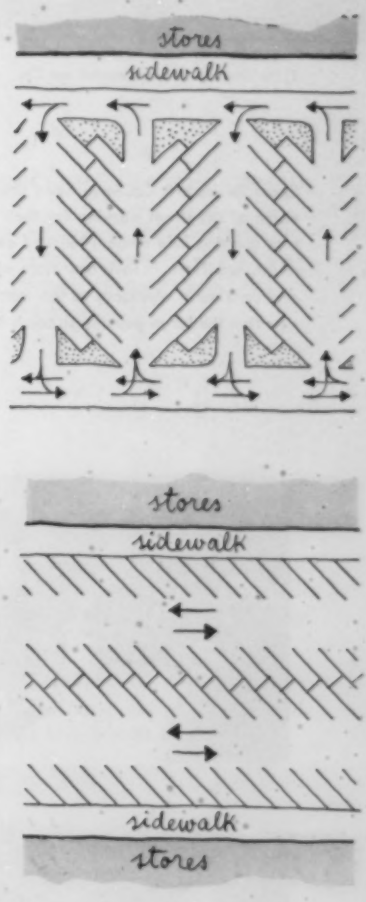

SERVICE STATION
ENTRANCES TO STORE FROM ROOF AND STREET
SEARS ROEBUCK AND CO
ENTRANCES TO STORE FROM ROOF AND STREET
4TH ST.
RAMP UP TO 4½ STREET
FARM STORE

Above:
Roof parking alone serves this Sears Roebuck store in Winston-Salem, N. C. The building itself fills the whole block depth between Fourth Street (in foreground) and Fourth & One Half Street. The latter is at roof level. The two streets are connected by a public road at one end, a ramp up the side of the building at the other. Shoppers' entrances to the store from street level and from the roof parking area are paired in a series of three stair towers. Architects: Shutze & Armistead

ard waste valuable space which might be put to more productive use. A sloping site, which makes such ramps unnecessary, may provide economic justification for some roof parking, but supplementary ground parking usually will be essential.

The vertical circulation encouraged by roof parking is of greater advantage to a single large store (particularly a department store) than to a shopping center which consists mainly of smaller stores. The latter depends upon its

CIRCULATION OF MOTORISTS ON FOOT



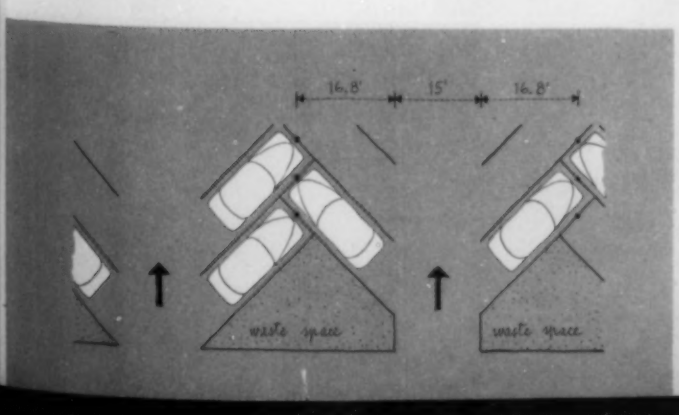
Right:
Most natural pattern for an easy flow of shoppers from cars to stores and back again is to have the parking lot aisles at right angles to the store fronts. Pedestrians can use the roadway or walkstrips set between the rows of parked cars. To be of any use such walkstrips must be wide enough to allow for bumper overhang on each side and still leave space for two people carrying bundles to walk abreast.
For shallow curb parking, aisles parallel to the store fronts are far more economical of space. This is equally true, of course, when this type of shallow front parking is carried into a deep court off the road (see page 116). It does make it more difficult for the shoppers to go from car to store and back again, worming between cars, if they cannot find space in the single row alongside the curb

310 sq. ft. per car **140 cars per acre**

Herringbone parking—here shown at 45 degrees without reducing size of stalls or aisles, saves the wasted triangle of space at the front of each parked car which occurs in all other angle parking layouts

Parallel line flow where all cars are parked in the same direction (left). The driver entering a fully occupied aisle must make a wide detour around the whole parking area before coming back to the same end to try the next row. (see page 121, for controlled version)

Back and forth flow, with one-way traffic, up one aisle and down the next (below). This makes the finding of an empty stall a much less lengthy business, for the driver goes up one aisle and, if he finds no empty space, simply turns around the end and goes down the neighboring aisle



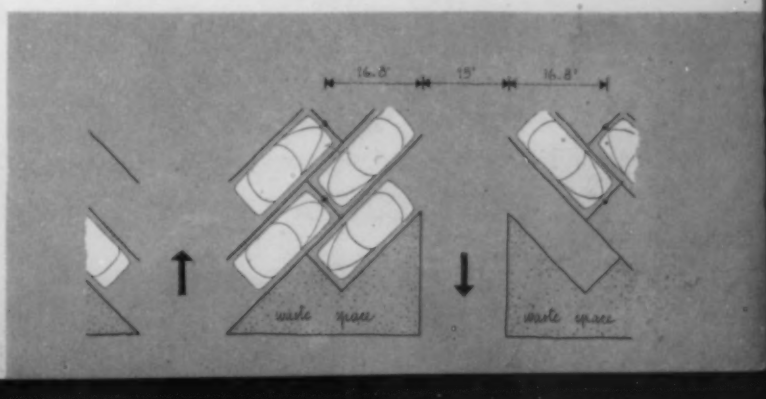
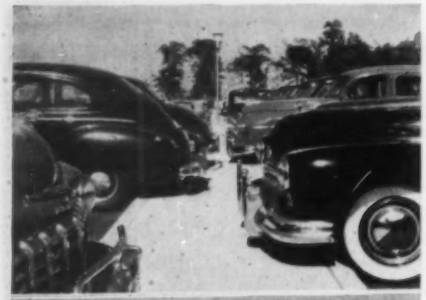


Photo Courtesy of Sears Roebuck and Co.

Bob Bailey Photo

Sears Roebuck & Co. have been among the outstanding pioneers in the provision of off-street parking for their retail store customers. They have tried roof parking (see page 119) and ground parking and various combinations of the two. Here, in their new store at Houston, Texas, they have given a new and convincing efficiency to the management of ground parking by making sure that the large parking space is used to its utmost capacity

A controller, from the windows of a room high up in one corner of the tower, overlooks the whole area. The parking aisles are all one-way with 60 degree stalls. At the store end of each aisle, along the service road by which all cars enter the lot, is a traffic light managed by the controller in the tower. In normal operation, as long as there is a single empty stall in an aisle the traffic light at its end will show a green arrow. When the aisle is full the con-



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Motorists as pedestrians. There is some dangerous confusion when pedestrians and motorists share the same aisles in the parking lot, particularly if there is two-way traffic (2). Raised walkway strips between the cars (1), if they are to be used, must lead in the right direction, toward the store front and not parallel to it, and be sufficiently wide to leave walking space for two abreast in spite of bumper overhang. This means at least 7 ft. wide, and better 10 ft. Where the parking aisles run parallel to the store front there may be a clearly marked passage for pedestrians, through the lines of cars and across the open aisles (3).

The Missing Link is between the cash-and-carry supermarket and the automobile which the shopper is using as delivery van. The supermarket may provide attentive, white-aproned squires to carry the heavy, bulky packages (4). Or some type of wheeled carts. Both are unproductive expenses as far as the merchant is concerned. For weather-protected loading he may provide a porte-cochere, a step away from the main entrance—to avoid congestion—but connected to it by a covered walk (5). Designed by Raymond Loewy Associates. Better still he could set up an underground moving belt to carry the packages to a pick-up station in the parking lot (6). This should give a considerable saving in personnel and, with space allowed for a sufficient "magazine" of waiting cars, should cause no congestion within the parking area. From a project by Raymond Loewy Associates.

The other possibility is "auto-shopping." Based on the same principle as the filling station and the increasingly popular auto-bank, "auto-shopping" aisles (7) permit quick purchases of standard goods and errands at laundry and dry cleaner without leaving the car. Auto-shopping does not eliminate, but simply complements selective shopping done on foot; conventional shops can be seen at the upper level, connected to the parking area by an overpass. Howard T. Fisher & Associates, Inc., Architects and Engineers

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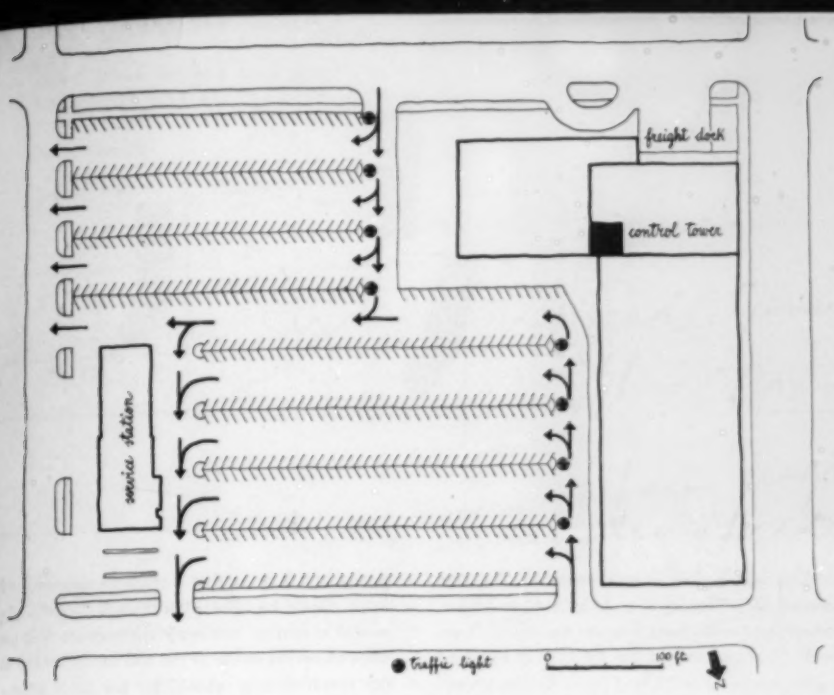
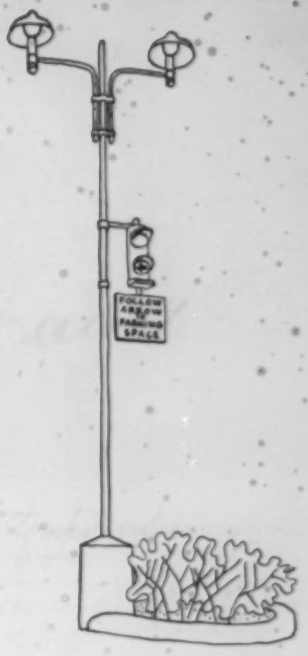
5 Dean Stone & Hugo Stoneff





troller will immediately switch that light to red. Some control system of this type is particularly necessary when the aisles are as long as they are here, making it extremely difficult for the arriving motorist to see from one end if there are any empty stalls.

A further economy in the use of a limited parking space is to empty the one-way aisles directly on to a side road, instead of providing a service road within the site. Such an arrangement would scarcely be possible without the tower controller.

It is interesting to notice that the freight loading dock, which one would normally expect to find at the rear of the building has been moved to a recess on the street front, where it does not interfere with the customer entrance from the parking lot. Architect: Kenneth Franzheim.

largest store — the supermarket or department store — to entice the traffic, the window-shopping pedestrians, upon which the smaller stores depend for a livelihood (and for which they are paying high rent). If the big store has roof parking, shoppers may not see and visit the smaller surrounding stores at all.

One advantage of roof parking which is often overlooked is the way in which it discourages the pirate parker who uses the shopping center parking space but trades with the competing stores across the street where no parking space is provided. The deterrent here is probably inconvenience rather than shame.

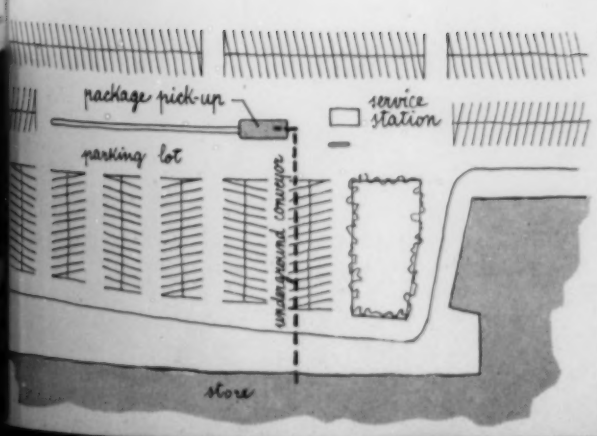
Under-store parking, a favorite of Le Corbusier and many another grand-scale planner, would have the advantage of protecting the shopper from the weather all the way from car to market and back again. Escalators would carry the shoppers up to the stores above. Unlike roof parking no space is wasted on ramps. Some merchants would deplore the lack of ground-level, street-front display space in such a scheme.

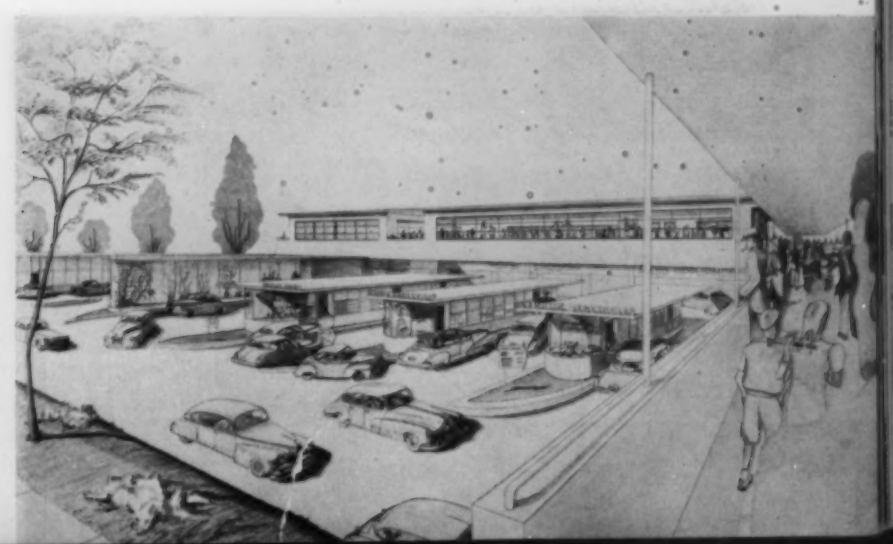
Multi-deck parking garages may be economically justified on expensive downtown sites. They are usually considered unsuitable for self-parking, though J. C. Nichols in his Country Club Shopping District in Kansas City, has had a three-level one in successful operation for several years. But for self-parking, ramps must be made wider and less steep.

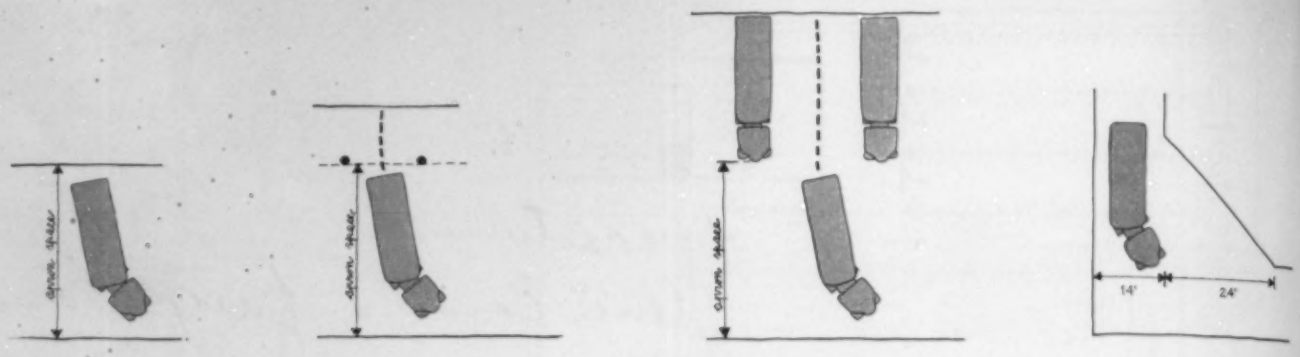
The final compelling fact, though, will probably remain the answer to the old question: Is it worth the cost?

PARKING AREA SIZE

How much parking space should be provided? Here is the most important, most widely disputed, and most incon-







FREIGHT LOADING DOCKS

The diagrams show the amount of space which should be allowed for maneuvering tractor-trailers in and out of a loading dock. The amount of apron space will depend on the over-all length of the tractor-trailer, and the width of the opening into which it must back. This is shown in the table at right. The apron spaces given are minimum for backing into a dock in one maneuver. The most common height for loading docks is 44 to 50 ins., though light trucks have a lower bed level. Overhead clearance should be 14 ft., for standard trailers range up to 12 ft. 6 ins. in height. Special loads, such as heavy machinery, may need greater clearance. Maximum width of the standard transport units is 8 ft., so that a minimum clearance of 10 ft. should be allowed. If there is a right angle turn in a narrow driveway extra space must be allowed on the inside of the turn (as illustrated in the sketch directly above) for the cut-in of the trailer wheels. *(All figures supplied by Fruehauf Trailer Co.)*

clusively answered question of them all.

The safest guides are presumably past experience combined with knowledge of local conditions (type of stores, local shopping habits, available public transportation). Indications are, however, that the more parking space provided, the more people decide to shop by car, and so the more parking space is needed.

The Urban Land Institute recommends a 2:1 ratio between parking area and floor area of stores. This is for "average conditions." In centers which rely almost exclusively on automobile shoppers (particularly in the West) a ratio of 3:1 is now becoming common.

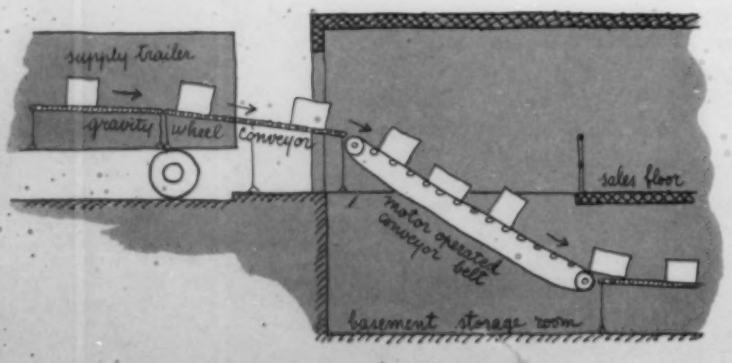
An important consideration here is the type of shopping which is expected at the center, whether leisurely selection such as we expect with women's fashions, or quick in-and-out transactions at drug stores, banks, service shops.

J. C. Nichols, in his Country Club Plaza, at Kansas City, counts on a turnover of 5 to 8 cars per day in each parking space. The designers of the North Shore Center, near Boston, are assuming a daily turnover of 3.5.

Waverly Taylor, a shopping center developer in Washington, D. C., came to the conclusion that a ratio of 2:1 was a necessary minimum, even where 60 per cent of the customers arrived on foot.

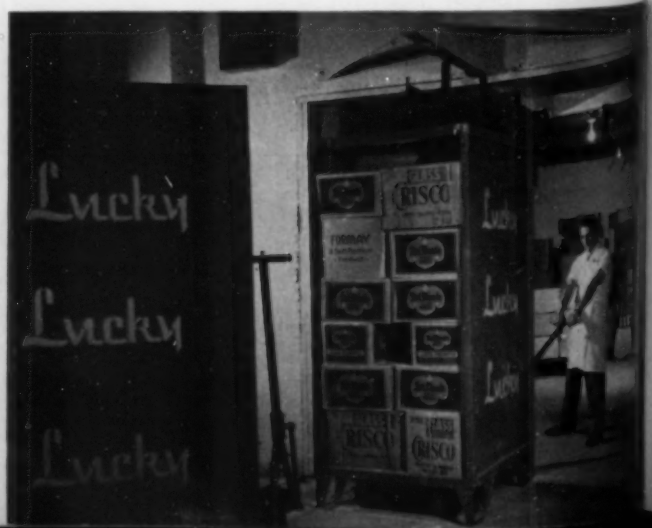
A more complex method of calculating the parking area required is to base it upon the expected annual gross sales of the stores. Assuming an average daily sales volume, an average dollar volume per sale, an average number of sales per customer, an average number of customers per car, an average daily turnover in the parking area, it is possible to find the number of parking stalls required in an average day. Multiplied by an assumed peak factor, this will give the number of stalls required to

Transfer of freight from truck to store shelves has too often been as makeshift as the customer's transfer of bulky packages from store to automobile. Gradually some more efficient systems are emerging. The use of sectional gravity roller conveyors is increasing, not only for transferring the goods from truck to store but also for moving goods within the store. By combining this with a motor-operated conveyor belt between floors, as shown below, the basement becomes accessible storage area. (First National Stores.)



Another system (illustrated below) designed to cut handling costs uses large standard bins holding about 60 cases of merchandise. Ten of these bins form a truck load. They are loaded and unloaded with a fork lift truck, then wheeled about the store on hydraulic lifts. (Designed by Raymond Loewy Associates, for Lucky Market.) This, like many other busy supermarkets, depends upon night work by stock clerks to have the shelves filled, ready for next morning's customers

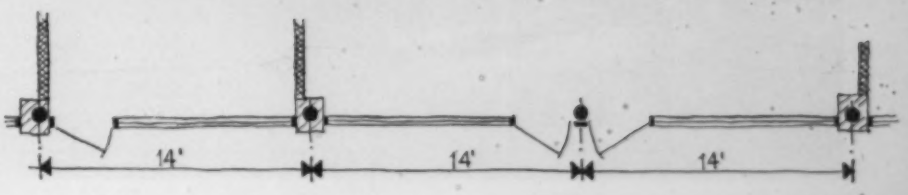
Dean Stone — Hugo Steccati Photo



"Apron" Space Required by Tractor-Trailer for One Maneuver into or out of Position (Measured from Outermost Vehicle or Other Obstruction)

Over-all Length of Tractor-Trailer	Width of Opening	Apron Space Required
35′	10′	46′
	12′	43′
	14′	39′
40′	10′	48′
	12′	44′
	14′	42′
45′	10′	57′
	12′	49′
	14′	48′

Right:
Flexibility in store widths can be neatly obtained even with a uniform span (here it is 14 ft.). The lally columns with stone casing form solid dividing posts; the one left bare in the two-bay store is quite inconspicuous behind the center entrance. Ridgeway Shopping Center, Stamford, Conn. Designer: Alfons Bach

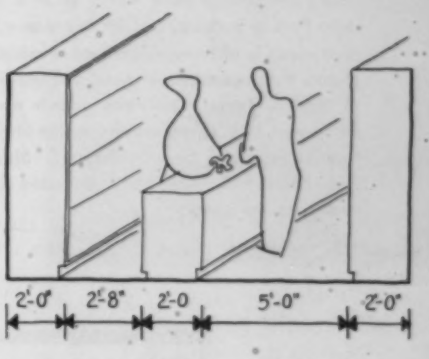


satisfy demand "on the last shopping day before Christmas." The beginner might well be frightened by this volume of assumptions and run back to depend on other operators' experience.

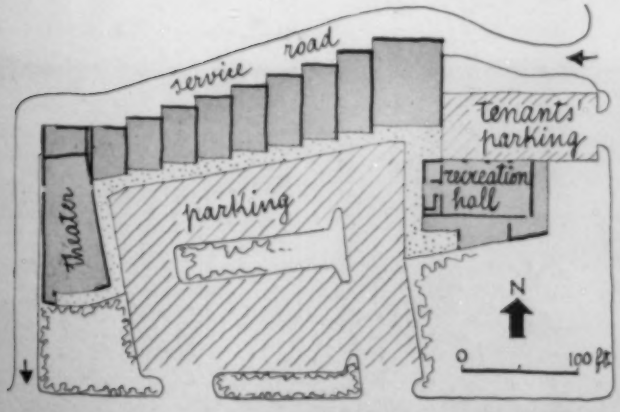
STORE BUILDINGS

Even more than most building types, the shopping center is still in the stage of groping and experiment. As experience grows, preferences change. The few generalizations gathered here reflect the opinions of many developers old and new. Such experience must, of course, be tempered by the local conditions of each job.

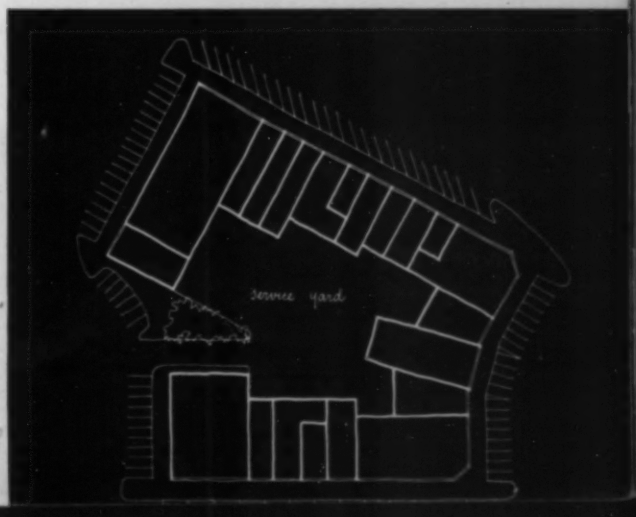
Right:
People and fixtures are the units which determine the most usable store widths. A typical section of average people and average fixtures will give a minimum usable width of about 12 ft. or 14 ft. with a display case at the side of the aisle. Of course, double racks for garment storage will be 3 ft. 6 in. wide, rather than the 2 ft. common in most other storage fixtures; but then there won't be need for a counter case. Naturally, all these dimensions (except the customer aisle width) mean nothing if the store is divided into two sections crossways by a counter parallel to the store front. This latter arrangement is often found in service stores



A staggered line of stores gives each store a rear dock at which a truck can load or unload without blocking the one-way service road. It also allows for a wide and useful variety in store depths, ranging from 84 ft. down to 48 ft. A separate parking area for tenants ensures that their all-day parking will not sterilize any part of the customers' front parking space. Aero Acres, wartime development for Glenn L. Martin Co., at Middle River, Md. Consulting architects: Skidmore, Owings & Merrill



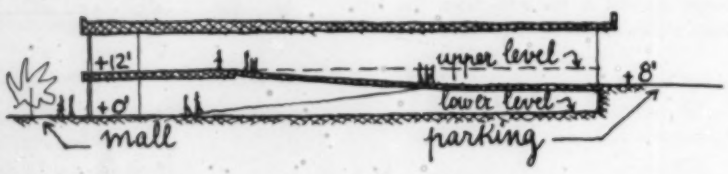
Below:
A variety of store depths is commonly achieved by projecting each store building as far as the tenant requires into an irregular service court with employee parking. To increase the size of any store it may either be extended further into the rear court or take over some space from one or both of its neighbors. There is only a single entrance from the street to this rear service court, so that it is effectively shielded from the view of shoppers. This sort of arrangement, a favorite of that vastly experienced Kansas City realtor, J. C. Nichols, is particularly suitable for downtown sites with a single row of front parking



Gottscho-Schleisner Photo

Basement stairs (above) need to be wide, shallow, inviting, if they are to seem worth climbing. Customers are always more willing to walk downstairs than to walk up, and for this reason basement space is often considered more valuable to a store than second floor space. This lower level at Lord & Taylor's suburban branch store at Eastchester, N. Y., opens out on one side at ground level to a parking area (see page 115). Architects: Starrett & Van Vleck. Raymond Loewy Associates, Designers

By a juggling of levels (below) what would otherwise be a basement becomes an attractive ground floor space fronting on a landscaped pedestrian mall; and the space above, which might seem an inaccessible second story, is practically at ground level as the shopper approaches from the parking area. The result is two equally attractive and accessible floors of selling space. To make the difference in level appear even less important, communication between the two floors is by ramps instead of stairs.



Depth of store buildings varies widely, with a tendency by supermarkets to demand 150 ft. where before they were used to 100 ft. or 125 ft. Local fire regulations which demand more exits once a store exceeds some given depth, and strip zoning for business which holds the stores in a narrow bank alongside the highway, are often controlling factors when a decision has to be made. To provide the greatest possible flexibility, so that changes of tenancy with different space demands may be economically satisfied, is the developer's overriding ambition. A common expedient is to provide space for expansion at the rear (often combined with rear parking), so that each store can be of different depth. Keeping the rear wall a curtain wall free of ducts, pipes, etc., will permit it to be demolished easily and re-erected in a different position.

The other favorite expedient, which is particularly applicable to certain difficult-shape lots, is to fit smaller stores into the angles when the main line of store fronts turns a corner.

Width of store buildings. Here flexibility is, if anything, more important than in the case of store depth. The ideal shopping center would be a continuous roof and floor with a clear open space between them uncluttered with any supporting pillars. All partition walls could be taken down and put up again — without any new material — within a few hours. While they are waiting for this to become structurally possible, designers do the best they can by

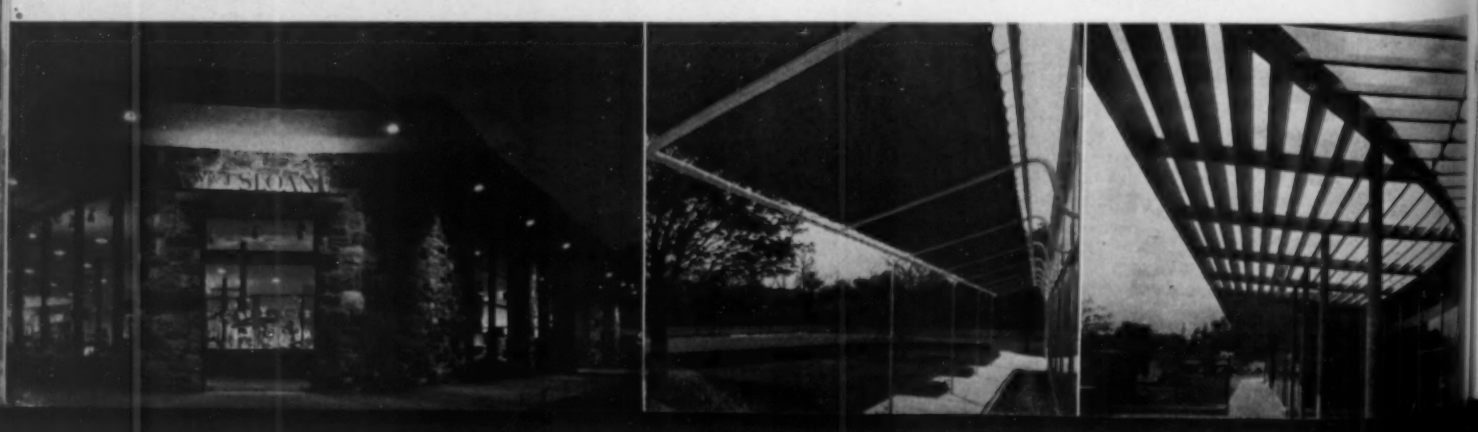
Canopies are gradually becoming one of the shopping center's standard amenities, a typical necessity in a one-story building group with outside circulation. This permanent canopy (1) sensibly includes built-in-sidewalk lighting. (Ridgeway, Stamford, Conn.; Alfons Bach Associates, Designers.) The light impermanence of brightly colored canvas on a pipe frame (2) gives a garden party mood to this suburban department store catering to women with a sense of fashion. (Lord & Taylor, Manhasset, N. Y.; Starrett & Van Vleck, Architects, Raymond Loewy Associates, Designers.) With calculated precision these blades (3) combine sun shading and ventilation, in a region where sun is more impelling than rain. (Bullocks, Pasadena, Calif.; Wurdeman & Becket, Architects.)

Signs within a shopping center may often be confined to certain uniform positions; to catch the attention of passing motorists signs must be high—this one (4) is 65 ft.— and set at right angles to the traffic flow. A row of large, brightly-lighted windows is further bait. (Lucky Market, San Leandro, Calif.; Raymond Loewy Associates, Designers.) Such restriction as this (5), with uniform signs, uniform lettering, can rarely be imposed by anybody less powerful than a U. S. government agency. (Linda Vista, Calif.; National Housing Administration.) But signs may be confined, e.g., within a band of corrugated transite (6), lit by a battery of torpedo lights, which throw light also on the sidewalk. (Oakland Gardens, Long Island, N. Y.; B. Braunstein, Architect)

E. M. Demerest Photo 1

Ben Greenhaus Photo 2

Julius Shulman Photo 3



keeping spans as wide as economically justified. Span widths must also be related to common store widths, which are based in turn upon more or less standard fixture dimensions. A side wall cabinet, plus a serving aisle, plus a counter cabinet, plus a customer aisle, gives a total store width of about 12 ft. This is consequently a common unit width. However, more and more stores are now favoring less conventional layouts. These fall outside the computations based on what was formerly standard fixture layout — another argument for extreme flexibility.

In any case it would usually be reasonable to have fixed equipment such as plumbing stacks and heating mains repeat every 24 ft., so that they will be available to serve a series of 12 ft. units. Further variation in width can be gained by some offsetting of partitions, without losing advantage of the original modular layout.

Ceiling height is always related to width and depth, the bigger the higher. Modern lighting and air conditioning make ceilings of more than 12 ft. unnecessary in even the largest store unit. In small shops 9 ft. should be sufficient. Of course these heights do not include the space which must be allowed for ductwork above the finished ceiling.

With a mezzanine floor, a minimum ceiling height of 16 ft. is necessary. To provide equivalent space in a basement is usually much cheaper. When basements are to be used by customers, whether as part of the store's selling area, or merely for services such as toilet rooms, the clear ceiling height should not be less than 9 ft. after allowance for air conditioning ducts, which here become essential equipment.

Basements and upper stories. Are they worth their cost? In the case of basements, an almost unanimous yes. The cost of basement space is normally low, especially in those parts of the country where footings have to be carried three or four feet below grade. If basement space is to be used for selling, it can be made much more inviting (and so more profitable) by a wide stair well in a prominent position with a flight of wide, shallow stairs.

Second story offices for doctors, dentists and professional men are found in many centers, but there seems to be some doubt about whether they really pay their keep. However, they certainly make the public think of the shopping center as a place where one goes for *everything*, and they may well bring some new customers to the stores. On an uneven site there are considerable possibilities for making a direct entrance from the road to the second story, which immediately increases its possible usefulness. Even on a comparatively flat site it may pay to adjust the levels so that each of the two floors opens on ground level at one side.

Equipment. The practice in most centers is to give each tenant his own heating (and often cooling) plant, on which he pays fuel and maintenance costs. Most shopping center owners claim that shopkeepers would be wasteful of heat were it to be supplied from a single plant serving the whole group of stores.

However, to make sure that the tenants are not stingy in the use of their equipment (particularly their cooling), in some leases it is specified that this equipment *must* be put into operation once the temperature reaches a certain level.

In the same way the tenants are usually compelled to keep their show windows lit till a specified hour in the evening, and to stay open late one or two nights a week.

8

7

Flowers and children mean trouble and expense for the shopping center promoter; but attention to their needs will pay highly in goodwill. A children's playground or nursery is one of the most popular amenities which a shopping center can provide, particularly in a neighborhood center where most of the customers walk to the stores (8). Nurseries are often proposed, few actually exist. (Levittown, Long Island, N. Y.; Alfred J. Levitt & Sons, developers.) Benches beneath a spreading oak (7) offer rest and shade to tired mothers and fretful children. (Fresh Meadows, Long Island, N. Y.; Voorhees, Walker, Foley & Smith, Architects)

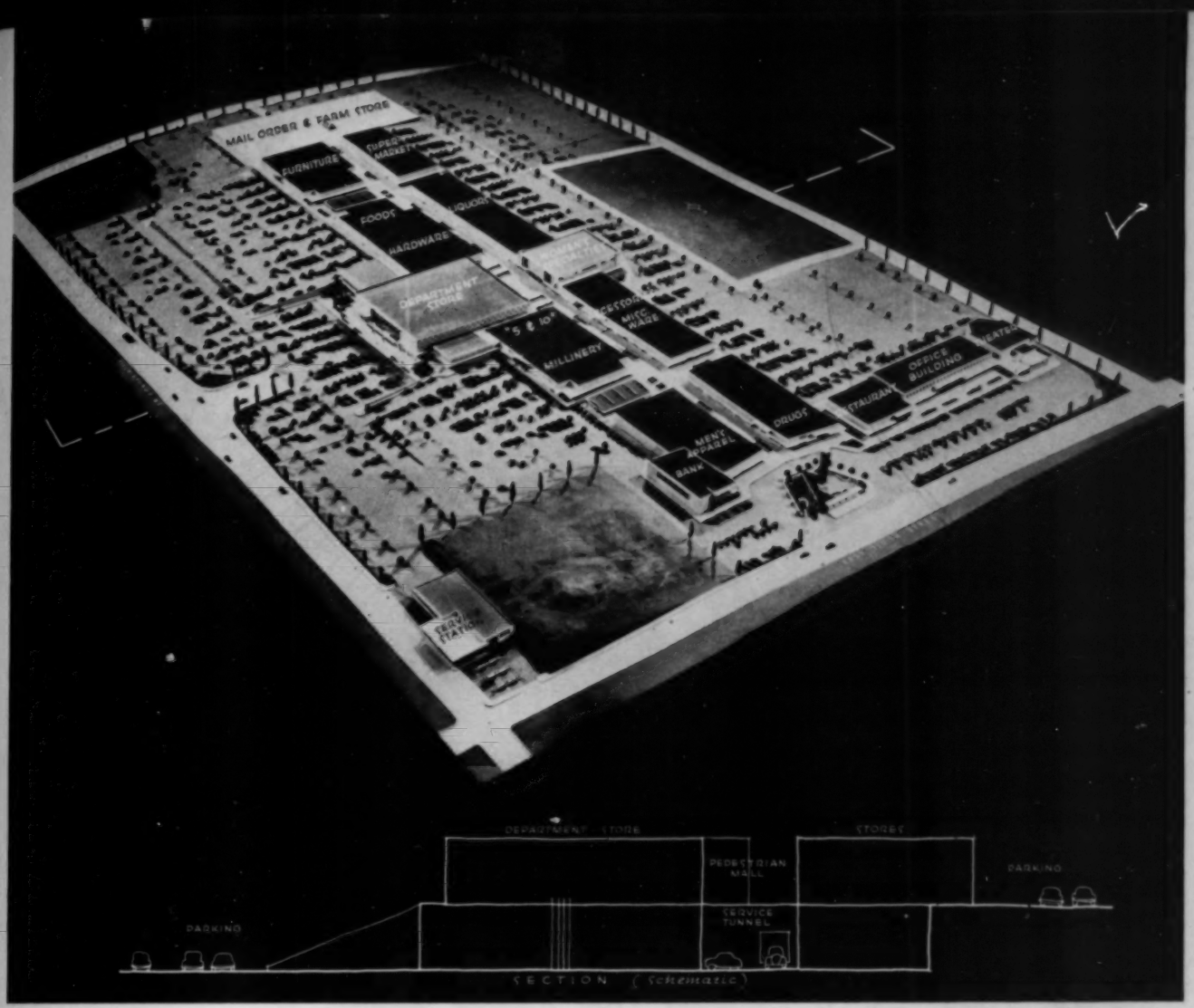
Dean Stone-Hugo Steccati Photo

4

5

6

MAY CO
DEPARTMENT STORE
BROADWAY-CRENSHAW
DEPARTMENT STORE
CRENSHAW BOULEVARD
SANTA BARBARA AVE
SANTA BARBARA
AVENUE
STORES
MARLTON AVENUE
RAMPED
EXIT
FROM
SERVICE
TUNNEL
RAMPED
ENTRANCE TO
SERVICE TUNNEL
STORES
CRENSHAW BOULEVARD
STOCKER STREET
PACIFIC TEL. & TEL.
ANGELES VISTA BOULEVARD



Kenneth S. Brown Photo

A change of level gives the Bon Marché two "ground floors," accessible at ground level on the mall side, the other on the parking side.

SERVICE TRAFFIC CONFINED TO UNDERGROUND TUNNELS

LEFT

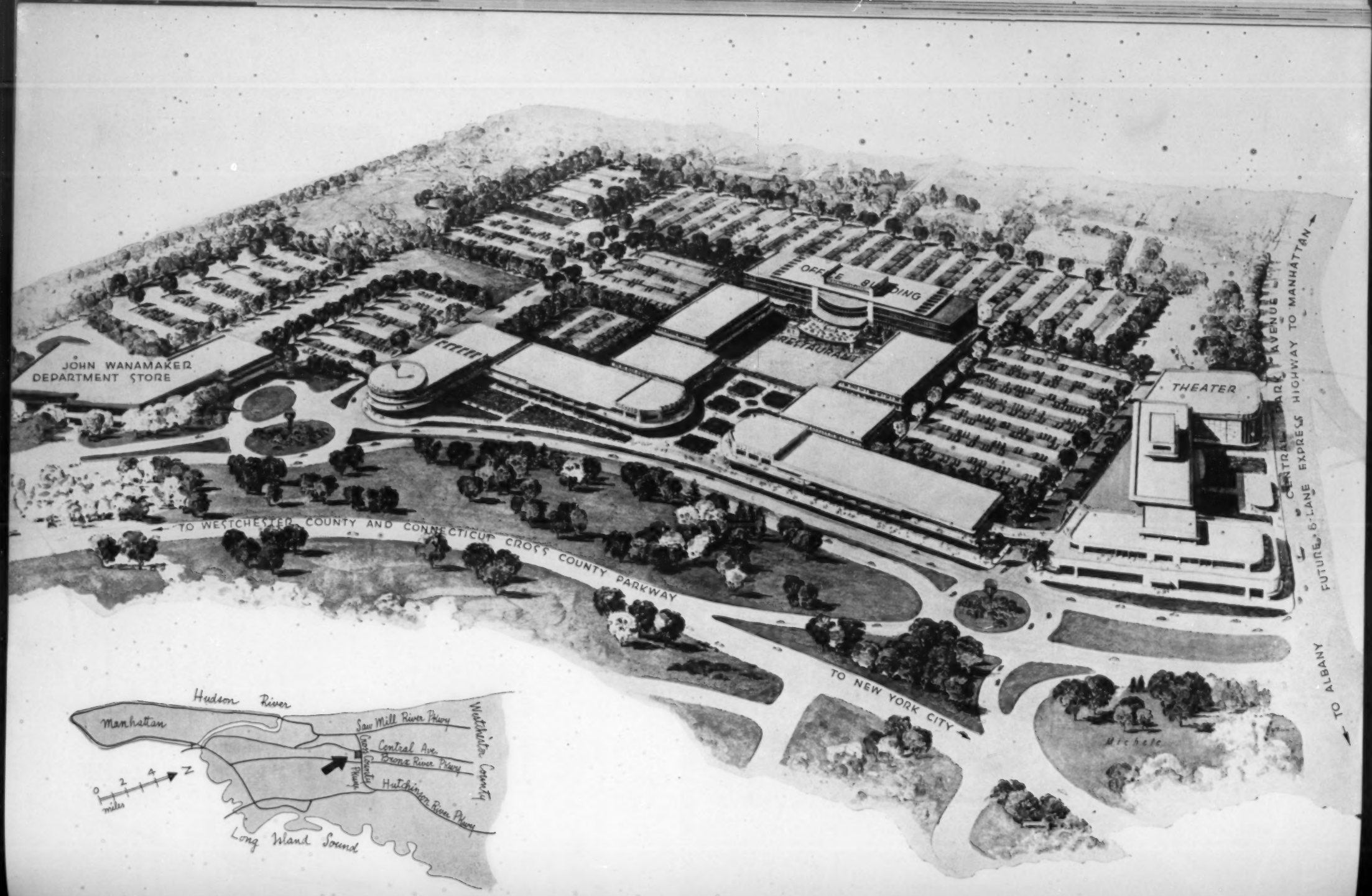
THE BROADWAY department store, developers of Broadway-Genshaw shopping center in Los Angeles, realized that the majority of their customers would be arriving by automobile and approach the stores from the 10-acre parking lot in the rear. They also expected pedestrians to enter from the street front, a fast-growing shopping avenue. Each store therefore has two fronts, one on the street, the other on the parking lot. All service traffic is relegated to a tunnel, 20 ft. wide and almost ½ mile long, with loading docks in the basement. The added cost was justified by the improved appearance and display value of the rear front, which becomes, like the street front, a windowshopper's walk sheltered by a wide overhang. Stores are 150 ft. deep. The four-story Broadway department store façade is clear of openings above the street level and serves as a billboard for displays seen from the parking area. Architect: Albert B. Gardiner.

ABOVE

NIPPED between Puget Sound and Lake Washington, Seattle can expand with ease only north or south (see map); though the Floating Bridge has speeded development of the eastern side of the lake (Bellevue's new shopping center capitalizes on this population movement). The projected Northgate shopping center will serve a population of about 300,000, increasing at an annual rate of about 9000. The 66-acre site is between major highways (see arrow on map).

The plan has a long pedestrian mall with a service tunnel beneath. Arcades between stores join this mall and the parking areas. The food stores and hard lines are at one end, the volume traffic-getter (Bon Marché department stores) right in the center, and at the other end the apparel and soft lines. For protection and possible expansion, the promoters have bought most of the adjoining land. Architects: John Graham & Co.

The pylon sign of this gas station shows up clearly from every one of the 2000 parking stalls. Architect: Albert B. Gardner, Associates: Wolfe & Thormin.


JOHN WANAMAKER
DEPARTMENT STORE
OFFICE BUILDING
RESTAURANT
THEATER
TO WESTCHESTER COUNTY AND CONNECTICUT CROSS COUNTY PARKWAY
TO NEW YORK CITY
CENTRAL PARK AVENUE
FUTURE 6-LANE EXPRESS HIGHWAY TO MANHATTAN
TO ALBANY
Michele
Hudson River
Manhattan
Saw Mill River Pkwy
Central Ave.
Bronx River Pkwy
Cross County Pkwy
Hutchinson River Pkwy
Westchester County
Long Island Sound
0
2
4
miles
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← WHERE THE CITY MEETS THE SUBURBS

Harris & Brown, Architects

On the narrow neck of land where Manhattan and the Bronx start to spread out into the Westchester County and Connecticut suburbs is the proposed Cross County shopping center. At Yonkers, N. Y., it is enmeshed in a net of parkways and expressways at the intersection of the Cross County Parkway and Central Avenue (an extension of the Bronx's busy Grand Concourse). Within a short bus ride are the densely populated areas of the Bronx and Yonkers. Within easy driving distance by parkway are most of the rich New York suburbs. The 60-acre site has been specially rezoned for business use. The new center will cater to the neighborhood trade with supermarkets, service stores, and a movie theater, to the passing motorist with restaurants and filling stations, and to the regional trade with branch department and chain fashion stores. The added possibilities of its position near Manhattan are reflected in the proposal for a five-story office building at one end.

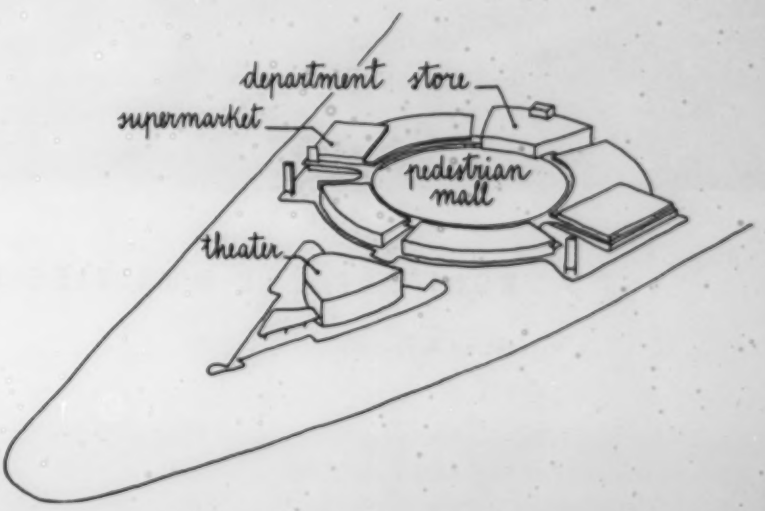
The central pedestrian mall has been carefully proportioned to combine the most spacious appearance with the shortest possible distance between one store block and another. The department store (John Wanamaker) is set in an unusual position on slightly rising ground at one edge of the center. It is hoped that it will draw traffic from Central Avenue (on to which the parkway clover-leaf also debouches) through the rest of the development.

TRIANGULAR SITE SUGGESTS CIRCULAR MALL

Kelly & Gruzen, Architects

The Maybrook shopping center, now building at Maywood, N. J., is set on a triangular site at the junction of two main highways.

The plan of the center has been most ingeniously accommodated within this triangle. The theater is set somewhat apart from the stores at the apex of the triangle. In the wide base of the triangle is the circle of stores surrounding a landscaped pedestrian mall dotted with smaller booths. Arcades between the store blocks lead from this mall to the parking area.



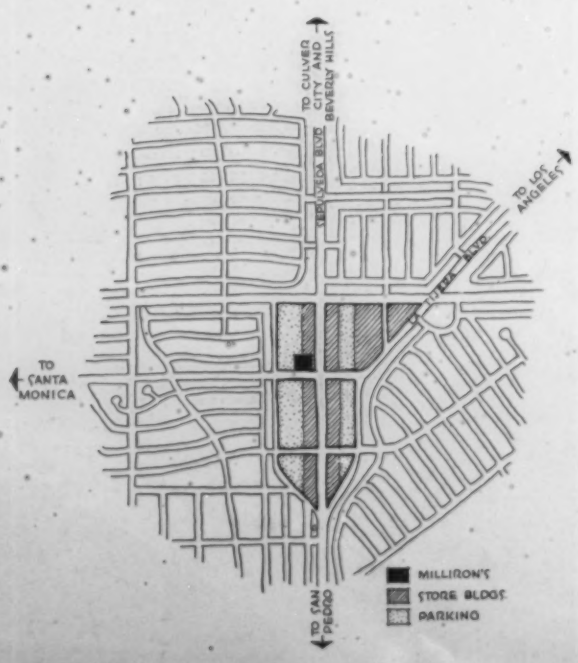
Louis Checkman Photo

William Eccles Photo

ROOF PARKING MODIFIES STORE LAYOUT

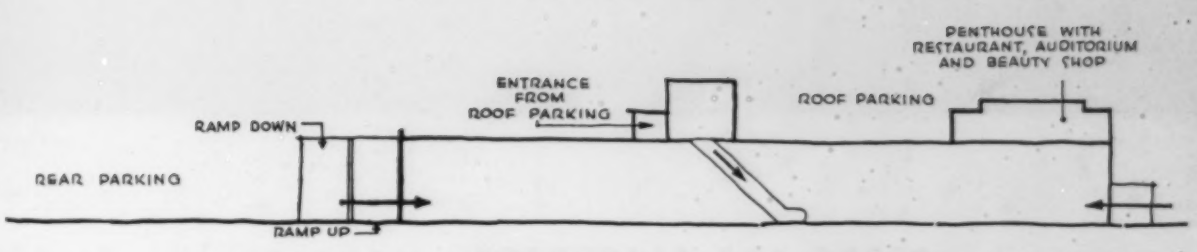
Gruen & Krummeck, Architects

In the center of residential Westchester, in the suburban area southwest of Los Angeles, Calif., Frank H. Ayres & Sons have laid out a 72-acre shopping center with parking space for some 3500 cars. Stores are set along the highways in a strip 500 ft. deep. With a store block 150 ft. in depth, the remaining 350 ft. should give sufficient parking area. But Milliron's department store required a building twice the standard depth which would leave insufficient space for parking. So for this store the ground parking area has been supplemented with roof parking. This in turn fitted in with two other new ideas: a main entrance from the roof via escalator to the center of the store, with the various departments opening out in different colored quadrants from the center circle (all advertisements refer to these various "stores" by color); and the addition of a penthouse story containing a restaurant and auditorium, (also a beauty shop and a nursery in which customers may park their children) which, being independent of the rest of the store, may be kept open later evenings and Sundays.



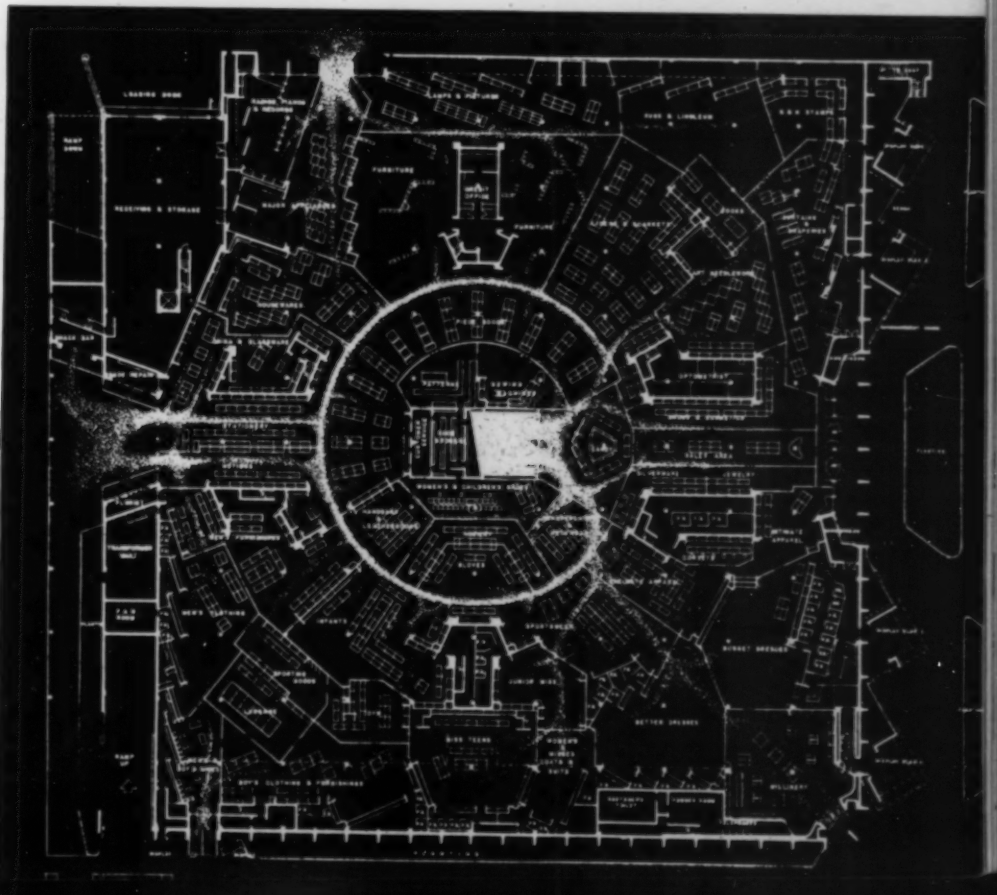
The roof accommodates 220 cars. Each of the one-way ramps serving it is 20 ft. wide, so that no woman shopper should be frightened off by the unaccustomed conditions of a drive-up store. At present this parking area is supplemented not only by the ground

Julius Shulman Photos



SECTION THROUGH CENTER OF STORE

space behind Milliron's, but also by that behind a proposed store block to the north. If and when those stores are built, it seems probable that the total parking space will be insufficient.

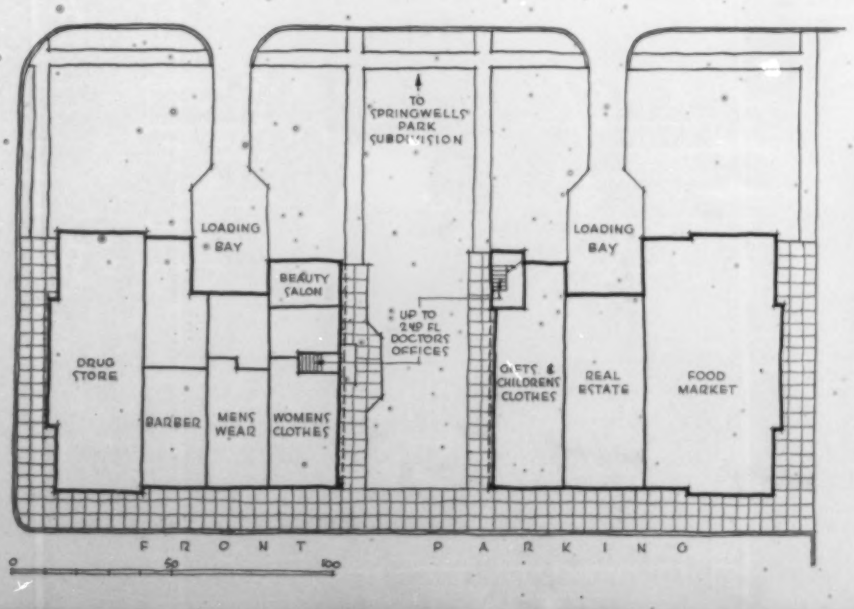


Shopper circulation, as estimated by the architects, shows the central entrance from the roof carrying as much or more traffic as the entrances from the rear parking area and from the street fronts. The symmetrical, radiating layout of fixtures is unusual in the modern department store, which tends to favor a series of free-form islands. The Center Circle, with the heaviest traffic, contains the merchandise normally found on the ground floor of a department store; the Rose store is for women's clothes, the Green store for men's and children's wear, the Blue store contains appliances and furniture, the Yellow store other household goods

STONE AND CLAPBOARD

Horace C. Colwell, Designer

THIS trim, stone-faced group of stores and offices is on the northeast edge of the Springwells Park subdivision, Dearborn, Mich. Both subdivision and shopping center were developed by the Ford Foundation. The stores are intended to supply the needs of the nearby residents, so the center is primarily designed for walk-in trade, much of it through the central mall which leads to the subdivision. The offices on the second floor are entered from the mall. The neatness and restraint of the whole design is in large part attributable to the confinement of all signs within a narrow band directly above the shop windows. The developers of the center have sensibly kept some of the site in reserve for possible expansion of buildings or parking space. The architectural detail conforms with the established style of the development

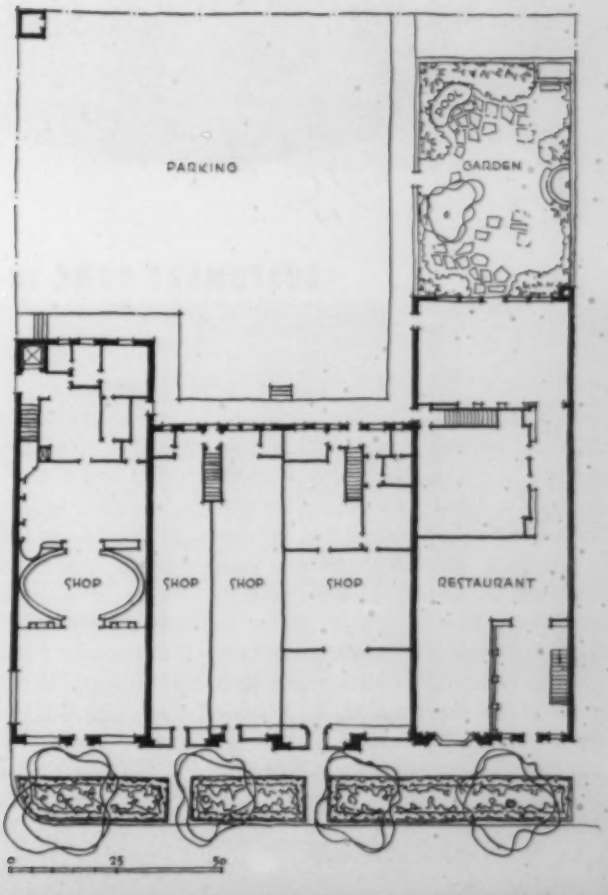


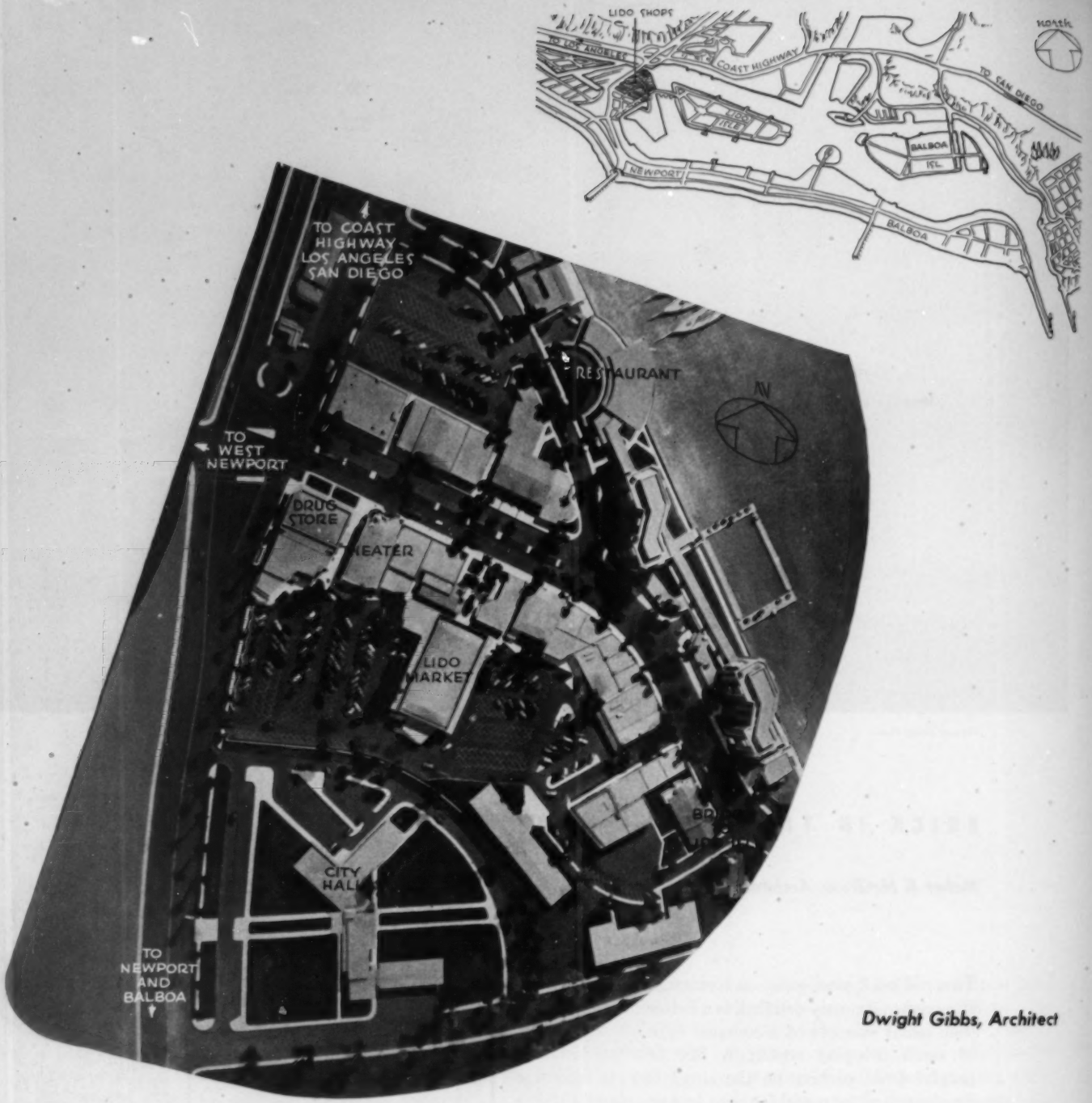
Nowell Ward Photo

BRICK IN THE COLONIAL MANNER

Maher & McGrew, Architects

THIS red brick store group in Evanston, Ill., crisp and neatly detailed, is a better than usual example of a common type of small shopping center. A line of parallel front parking on the street is supplemented by a parking area in rear which is made vastly more attractive by a small garden at one end, overlooked by the rear windows of the restaurant. On the street front an extra wide sidewalk allows space for a line of trees and flower beds between the street and the store show windows which are all shaded by uniform, gaily striped awnings with the store name along the front edge. This latter detail, a particularly happy idea, is typical of the thought and good taste which has been put into this project.





Dwight Gibbs, Architect

CUSTOMERS COME IN BOATS AS WELL AS AUTOS

BRANCHING off the Coast Highway to reach Balboa and Lido Isle (see map), motorists inevitably pass through the Griffith Co.'s Lido Shops development now under construction at Newport Beach, Calif. And then later, having got into their vacation clothes and gone aboard one of the 5000 pleasure craft in the harbor, they return by water to the Lido Shops anchorage, go ashore to the special Ship's Galley maintained by the Lido supermarket, and order supplies enough for a cruise.

As this whole seaside area is changing gradually from a summer resort to a year-round community, Lido Shops' position, straddling a highway bottleneck and across the street from a good anchorage, becomes increasingly important. So far built are a theater, drugstore and supermarket. A restaurant with terraces hanging out over the water is already under construction; plans are in hand for a hotel and apartment house to occupy the rest of the waterfront. The new city hall is on the inland side of the store group.

In line with local custom the stores are built without basements. To provide storage space, and to give an imposing two-story front, there is a mezzanine floor at the rear. This is used mainly for storage. The merchandise is lifted from the freight dock by a belt conveyor, then sent where needed in the store by gravity feed.

All exterior painting and landscaping conforms to a standardized color chart prepared by the architect; and all exterior signs must be approved by a committee of owner, architect and advertising counsel.

Left: the landscaped parking area at the rear of Lido Market. Below: the street front of Lido Market is set back behind palms and flowerbeds

Floyd Hopkins Photo

The two-story-high glass front of the drug-store makes an impressive showing on the main road corner next to the movie theater

PRESTRESSED CONCRETE

Exploits virtues of steel and concrete . . . in effect creates new material

By H. Vandervoort Walsh, Architect, and Anselm Cefola, Civil Engineer

Such delicate bridges as these could not have been built with ordinary reinforced concrete; such long, straight, shallow spans could not be strongly enough reinforced. Only through the use of a revolutionary technique in reinforced concrete construction, *prestressing*, could they have been produced. Prestressing has been practiced for some 20 years in Europe where costs of materials are high, and of labor, low; it is beginning to gain considerable interest in this country.

Actually, circular tanks of prestressed concrete have been built in this country for at least 20 years, and the manufacture of large-diameter prestressed concrete pipe has been common. Through the application of new techniques introduced about six years ago, the architect and engineer can now utilize the advantages of prestressed concrete in most types of circular structures. On the other hand, practically nothing has been done in this country with prestressed concrete bridges, beams, slabs, etc., which are in evidence in Europe.

Examples of such bridges and buildings in France and Belgium have emphasized to alert American engineers the system's many advantages for exploitation in this country. Shortage of steel was one economic factor in Europe which abetted the development of prestressed concrete, which requires less steel than ordinary reinforced concrete; for the same reason its use in the U. S. may have a sound practical value. Probably one of the most important features to American architects, however, is the possibility of obtaining *crackless* concrete by prestressing.

How Prestressed Concrete Works

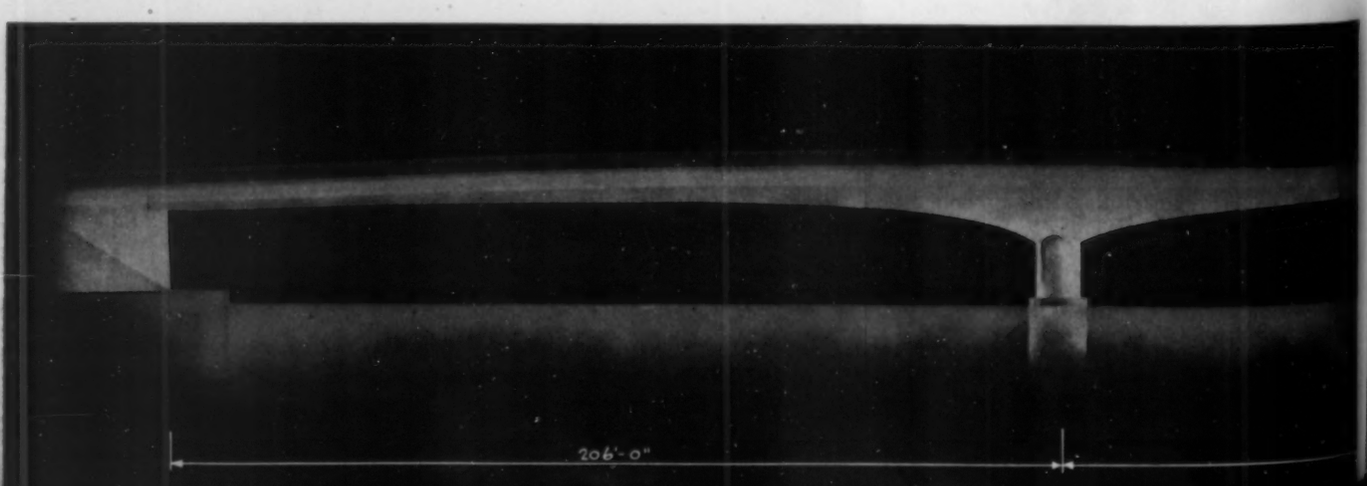
What happens when any beam carries a load? It bends and its center sags lower than its ends. Thus the bottom fibers are stretched while the top fibers are compressed. Since concrete resists compression well, the designer puts enough of it in the top to absorb all the compression safely. On the other hand, since the concrete has very little tensile strength — but steel has a lot — he inserts steel bars to take care of tensile stresses.

The trouble is that concrete shrinks as it hardens. The reinforcing bars, however, do not shorten much and consequently offer resistance to the concrete shrinkage, actually putting the bars in compression. When the concrete is loaded, the load causes considerable tension in the reinforcement. Since this reinforcement started out with a slight compression, and then in turn is subjected to considerable tension, it is obvious that its change in length is of such magnitude that the concrete cannot usually follow; it cracks.

In prestressing, concrete's virtue of high compressive strength is used to compensate for its lack of tensile strength through a very different concept in the use of reinforcing steel.

Steel wires are strung through a concrete beam, for example, are stretched and then anchored at the ends of the beam when the concrete is hard, to put a "squeeze" on the beam. The wires either are strung through a hole in the beam provided by a mold, and are tensioned against the end of the beam (we shall call this process post-tensioning), or else they are stretched first and held by some anchorage, after which the concrete is poured around them. When the concrete is hard, the wires are cut and the ends of the wires return to their original shape outside the beam — because the stress is relieved there — and act as wedges to help hold the wires bonded to the concrete in tension (this

Drawing courtesy of The Preload Corp.



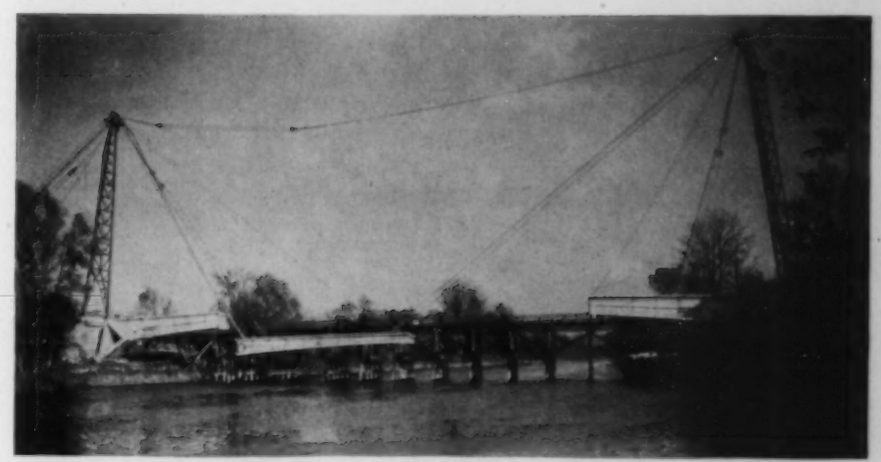
1 Photos by H. Baranger courtesy of Raymond Concrete Pile Co.

is called pre-tensioning, and is explained more fully later in the article).

In prestressing, the concrete in the beam is squeezed so that it is always in compression, and any tensile stresses that might appear due to loading, and cause cracks, are automatically canceled out. The application of stresses before the beam is loaded is the basis for the name "prestressed concrete."

A simple analogy of the workings of prestressed concrete is illustrated in Fig. 8. A man is holding a stack of books horizontally by pressing against the ends. The books held by the man correspond to slices of concrete that are squeezed together by the prestressing forces illustrated by the arrows and hands and arms. Obviously if the forces are large enough, there can be no cracking tendency since all the joints between the books, or concrete slices, are in heavy compression.

In prestressed concrete the full potentialities of high-strength steels are utilized because the wires can be tensioned in excess of 140,000 psi. Compression in concrete, however, is not much more than 2000 psi at any point because the dead and live loads work to cancel the great squeeze put on the



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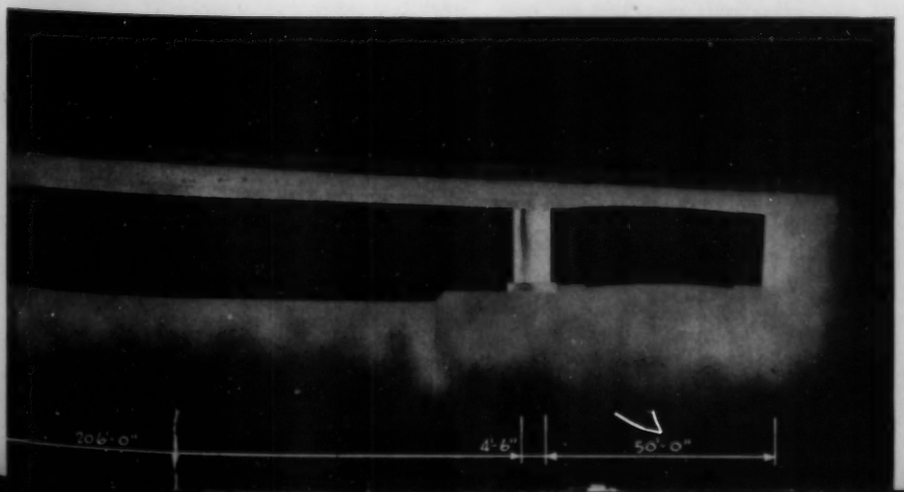
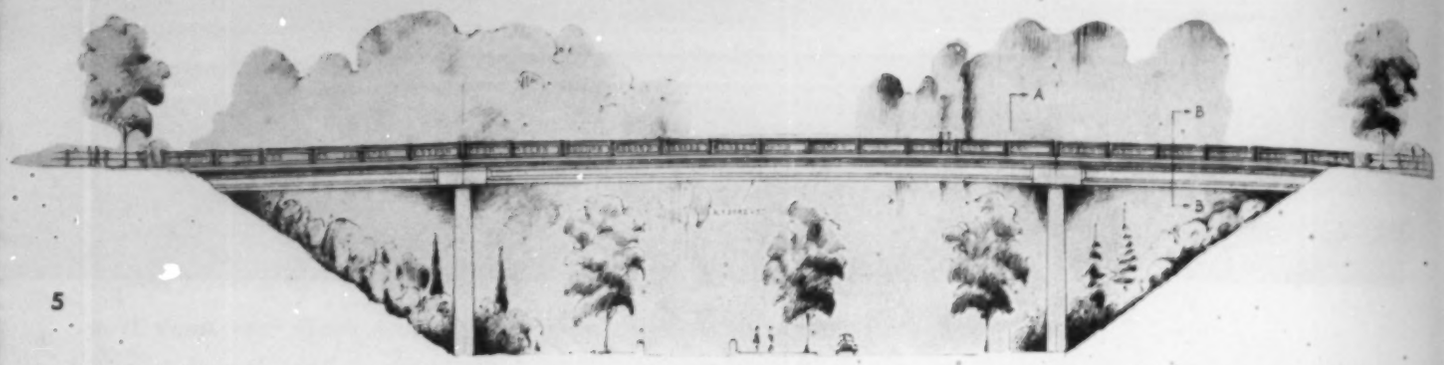


1. Bridge over Marne at Luzancy, France, span 182 ft. Designed by Freyssinet, the bridge has depth to span ratio of 1 to 45. 2, 3. Another Freyssinet bridge, this one at Esbly, has 240 ft. span. These bridges were assembled from precast sections. 4. First continuous bridge to be built with prestressed concrete, going up over Meuse at Sclayn, Belgium; supervising the project is Prof. Gustave Magnel. Shape at the center pier is completely functional



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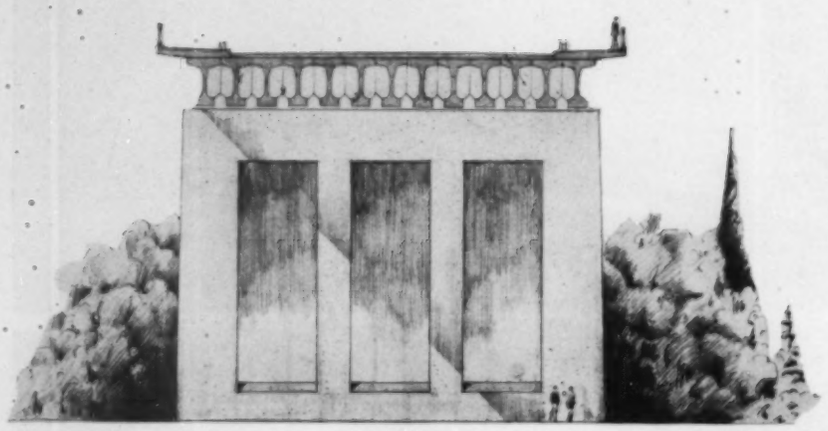

A-A

B-B

Walnut Lane bridge to be built of prestressed concrete at Philadelphia will be first of its type on this continent. High strength steel wires stressed to 125,000 psi put girders in compression (max. 2000 psi) to cancel out tensile stresses that tend to appear due to dead and live load, thus preventing any cracking

beam. Since the allowable stresses in a prestressed beam are much higher than they can be in an ordinary reinforced beam (about twice as much compression in the concrete and more than seven times as much tension in the steel) this suggests, in itself, the possible savings in materials.

As an example, a comparison has been made by Herman Schorer using a rectangular beam or slab to carry a live load of 200 lb. per sq. ft.* The prestressed concrete beam design was based on using steel wires with an ultimate tensile stress of 200,000 psi and on concrete having an ultimate compressive stress of 6000 psi with an ultimate safety factor of 2.5. As a result of calculations, the beam was designed to be 12 by 16 in. and had in it only 0.725 sq. in. of steel wire per ft. of slab width.

By contrast, design of ordinary reinforced concrete for the identical load resulted in a beam 12 by 32 in.; area of steel reinforcing rods was 3.64 sq. in. per ft. of slab. This design was based on 1000 psi compression for concrete and 20,000 psi tension for the steel.

Advantages

All this leads to the following conclusions as to the advantages of prestressed concrete:

(a) It is economical of materials due to the use of higher steel and concrete stresses. (It is impossible to generalize much about building costs until more work is done in this country. However,

* Journal of the American Concrete Institute, Sept., 1946

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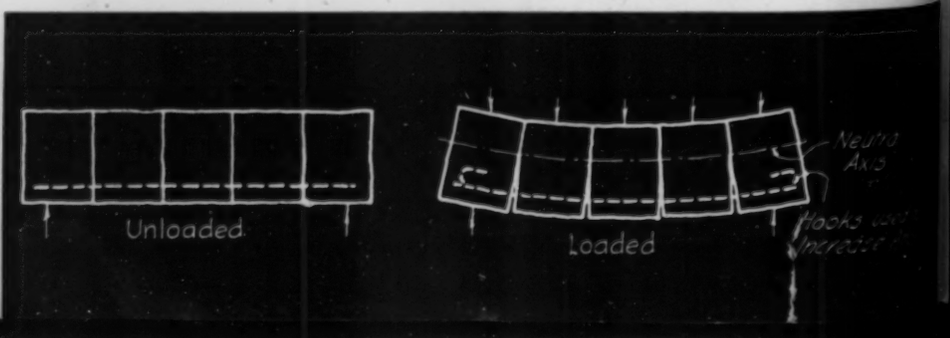

6. Shows effect of load on ordinary reinforced concrete beam; concrete can't stretch so under side begins to crack. 7. In prestressed beam wires are tensioned to put beam in permanent compression (gives slight arch); under load beam bends but does not crack. 8. Prestressing is explained simply by this analogy — the more squeeze the man puts on the books, the more he can hold

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9. Textile mill at Ghent, Belgium, covering area of 375,000 sq. ft. uses 100 main girders and 600 secondary girders of prestressed concrete; each main girder carries about 28 tons per linear ft. and bridges a span of 72 ft. 10. Typical bay of this mill, designed by Magnel

Photos and rendering courtesy of The Preload Corp.

it is known that for large spans, as in bridges, great economies can be effected. The same holds for circular prestressing. Smaller units such as building framing would undoubtedly have to be mass-produced to achieve economy, but not enough is known to make a conjecture on this score.)

(b) It eliminates cracks because the concrete is always in compression.

(c) It permits less depth of beam as related to the span, and hence gives more headroom (this is especially important with bridges and airplane hangars).

(d) It has remarkable elastic properties. For example, tests were made on a floor slab only 1⅝ in. thick, reinforced with not more than 1 per cent of steel. Although the span was only 10 ft., the slab deflected 3 in. under a concentrated load of 1070 lb. at its center. When the load was removed it returned to its original level, undamaged.

(e) Beams do not have to be cast at the site in one form, but may be cast in small sections or blocks at the factory with reinforcing wires threaded through them. When the wires are stressed, the small units are brought together like one large beam.

(f) It develops remarkable resistance to shear stresses. In one case a 4-in.-thick slab was tested by a 6-in. punch. Its resistance to this shearing action was 800 lb. per sq. in.

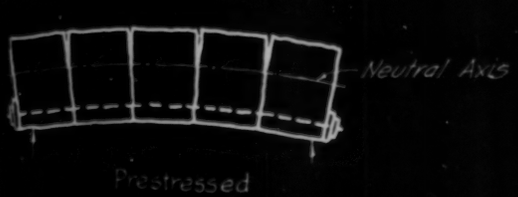
The items which contribute most to the higher cost of making prestressed concrete in comparison with regular reinforced concrete are the special formwork and devices required to anchor the prestressing steel on the ends of the beam, and the cost of the actual prestressing operation in the field.

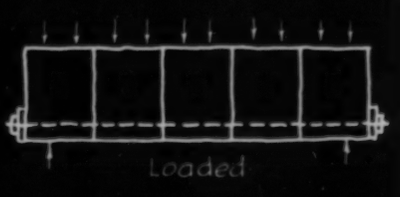
Development and Applications

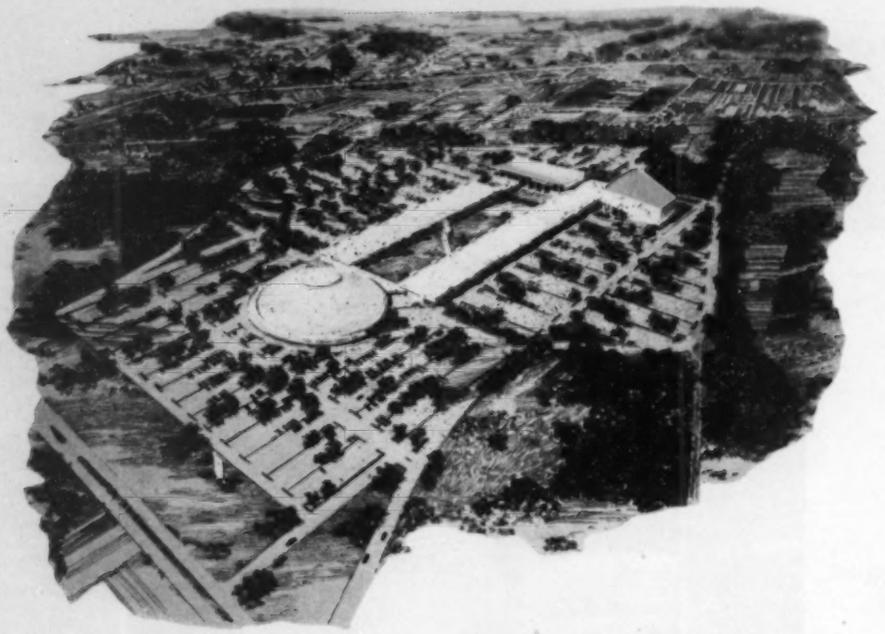
As long ago as 1888, Doehring, in Germany, secured a patent for a mortar slab that was to be reinforced with metal that had tension stresses applied to it before the slab was loaded. Test failures here were said to have resulted from a poor quality of concrete. Early attempts at prestressing failed principally, however, because the designers did not take into account either the shrinkage and plastic flow of concrete or, to a lesser extent, the creep of steel which soon canceled the low prestress applied.

In 1923 R. S. Dill of Alexandria, Nebraska, recognized the need for high tensile steel and carried out the prestressing after the greater part of the shrinkage had taken place.

First to appreciate the full significance







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Main building of proposed shopping center for Beverly, Mass., has a circular prestressed dome 220 ft. in diameter, freeing interior space of columns. It is possible to design such a large dome by stretching wires around its edge, putting it in high compression

cable and jack method of prestressing concrete, wherein a cable embedded in the concrete is prevented from bonding by means of a steel sheet tube or a wrapping of impregnated paper. In his work, before the concrete was placed, concrete drums were set at opposite ends of the form, and the ends of the reinforcing wires were threaded through conical holes in the drums. Used as anchor plates, the drums transferred the stress in the wires to the concrete. After the concrete had been poured and had attained sufficient strength, the wires were secured to one drum by means of a conical plug which acted as a wedge. The wires were then attached to a double-acting jack at the other end, were tensioned and then secured by ramming another conical plug into the drum at that end. The original procedure has been refined, but the principles are basic.

A method similar to this was developed by Prof. Gustave Magnel of Belgium. After the concrete hardens, Magnel prestresses the wires with jacks. When tensioned sufficiently the reinforcing wires are locked against a cast-steel distribution plate by using a sandwich plate and wedges (see Figs. 12, 13, 14, 15).

In addition to many successful bridges, Freyssinet has designed and built another prestressed wonder, the airstrip at Orly airfield, near Paris. It is only 6⅜ in. thick, but has strength equal to that of a conventional strip 24 in. thick. When heavy planes land, the elasticity of the prestressed concrete

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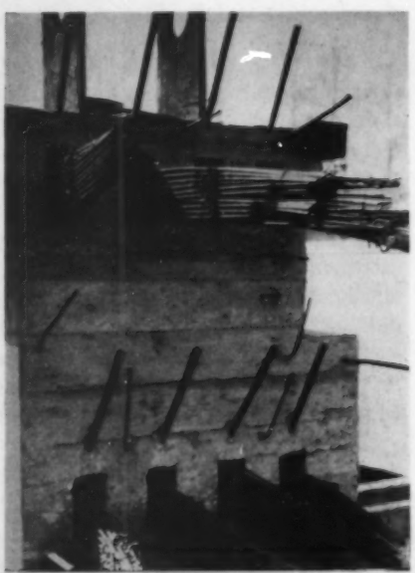

of plastic flow and creep, and to measure them, was Eugene Freyssinet of France, who is frequently called the father of prestressed concrete. In 1928 he did the first practical prestressing with a high-grade, vibrated concrete heated almost to boiling temperature, and high-tensile steel.

Reinforcing Not Bonded

In 1939 Freyssinet introduced the

12, 13, 14, 15. Prestressing as done by the Belgian method. 12. End of girder before it is prestressed; cables are strung through beam after concrete is hard. 13. End of girder after wires have been tensioned by a hydraulic jack (14) and anchored by means of sandwich plates; pipes sticking out are for injecting grout after girder is prestressed

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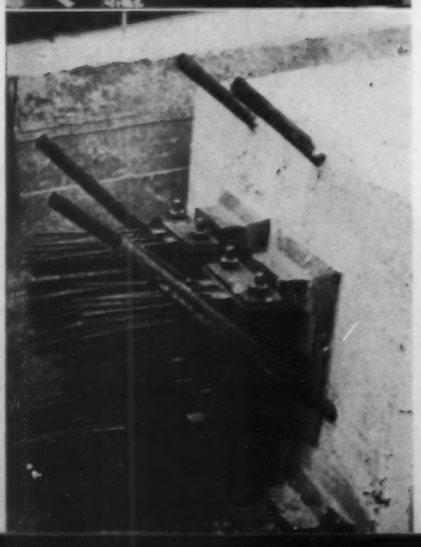

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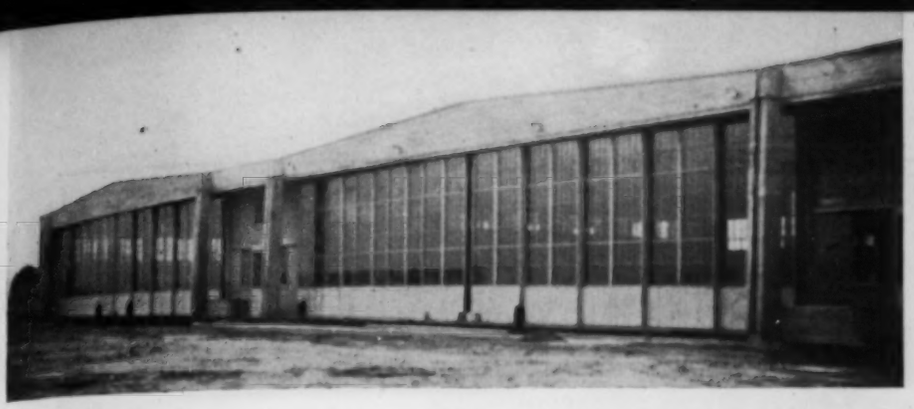

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Photos and rendering courtesy of The Preload Corp.

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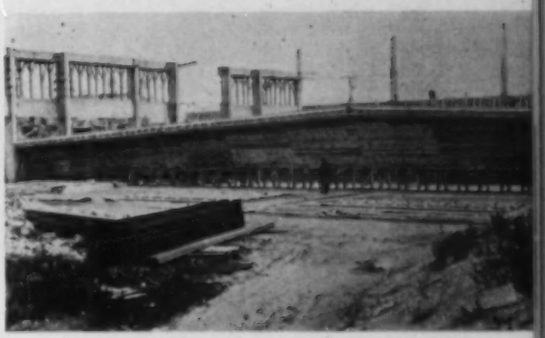

16. Hangar at Melsbroek, airport of Brussels; one prestressed beam carries load of 3,500 tons. 17, 18. Use of 168 ft. beams of prestressed concrete allowed a clear height of 32 ft. from floor to beams

allows it to crack under impact, but the cracks heal as soon as the load is removed.

In Brussels, Belgium, under the direction of Prof. Magnel, an airplane hangar recently was completed which is noteworthy for its shallow prestressed concrete roof beams. These have a span of 168 ft. and are only 9 ft. 6 in. deep at the center. They are spaced 32 ft. 6 in. center-to-center and have a clear height, even at the ends, of 32 ft. To solve the same problem with ordinary reinforced concrete would have called for arches having a rise of 30 ft. Magnel has prepared a motion picture on prestressed concrete that has been shown frequently in this country; he has also written an authoritative textbook on the subject.

Bonded Prestressing

Bonded prestressing was suggested by E. Hoyer in Germany and has been used much in prefabrication shops in England. Piano wire is used so that the surface that contacts and bonds with the concrete is large in proportion to the total cross-sectional area of the steel. The wires are placed in forms and put under tension before the concrete is poured and vibrated into position around them. When stretched out they are smaller in cross-section than when unstressed. The concrete hardens around them while they are still small; when their artificial tension is released after the concrete hardens, they expand, reverting to their original shape, and grip the surrounding concrete. End plates are not necessary since the bond between concrete and wires is sufficient to create compression in the concrete. Two-inch concrete exterior wall panels have been similarly made in casting beds up to 100 ft. long. It is possible to box out window and door openings in these panels, letting the wires run through the openings, and to cut the wires here at the same time the others are being cut. In this manner, two-story panels have been produced and raised from a horizontal to a vertical position without any sign of cracking. Similar panels of ordinary reinforced concrete usually require at least 4 in. thickness to resist the lifting stresses.

Another method, suggested by H. Shorer, involves the use of prestressed units which can be laid in the forms just as reinforcing bars are laid in ordinary concrete. The unit consists of a core rod with end disks to which are attached the wires that are to be prestressed. These wires are strung around the core in spirals and kept in place by intermediate disks spaced equally along the core. When the wires are stressed, the core acts as a column, and the intermediate disks keep it from buckling. After the wires are stressed sufficiently they are locked at the end disks; and the core bar, now acting as a compression member, maintains the tensile stresses

Method of anchoring the tensioned wires to the end of a beam. Sandwich plates hold wires by wedge action and transfer stress of wires to distributing plate and thus to beam, placing the beam in compression; each wedge holds two wires. In early applications cable was placed in sheath to prevent bonding during concreting; now, steel or rubber cores, later removed, leave holes for introducing cables

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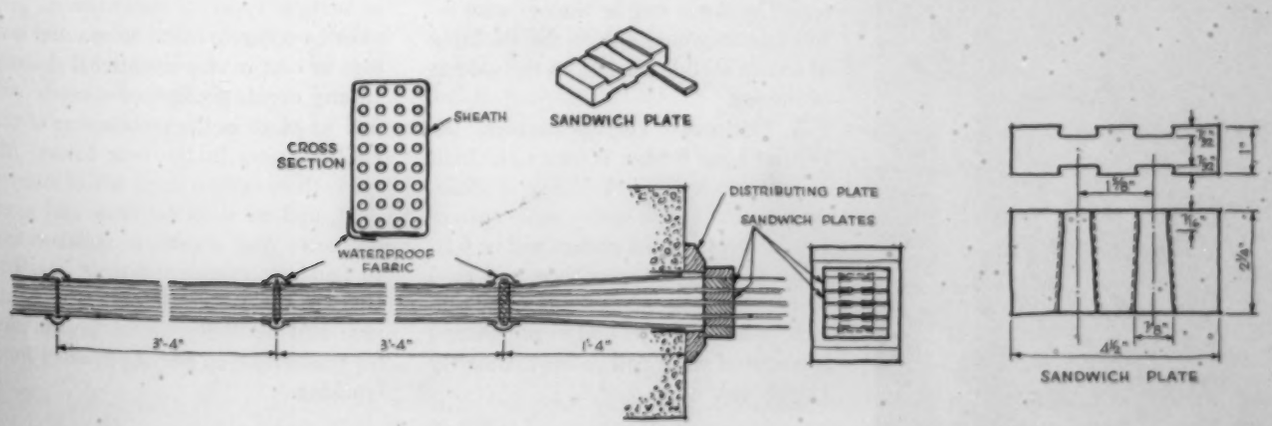

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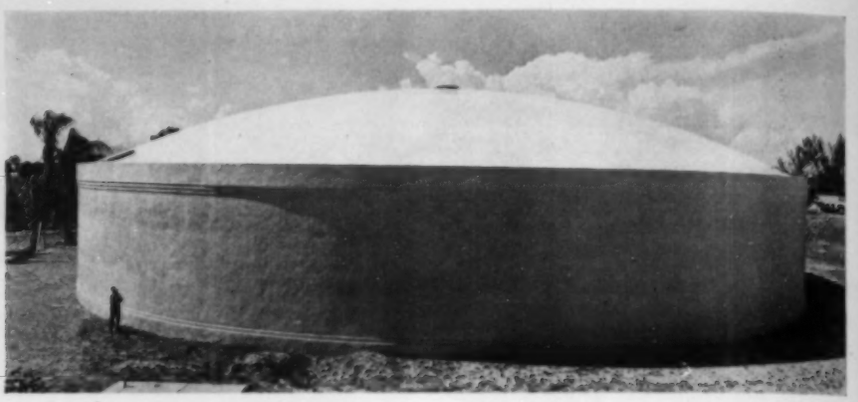

19. In manufacture of prestressed concrete tanks, machine stresses high strength wire by pulling it through a die as it is spiralled around the tank; the wire is later covered with gunite. 20. This prestressed water tank in Miami, Fla., has a diameter of 128 ft., depth of liquid 27 ft. 8 in., and capacity 2,700,000 gal.

in the wires. In this condition the reinforcing is laid in the forms and the concrete is poured. Since the rod is covered by a paper tube, the concrete does not bond with it, but it does bond with the wires. After the concrete is hard, the core rod is pulled out and the tension in the wires now sets up the needed compression in the beam.

Present Applications in the U. S.

The most direct application of prestressed concrete in the U. S. at present is the making of concrete tanks, pipes and tubular concrete piles. The internal or hydrostatic pressures in the pipes and tanks cause tensile stresses in the walls. By prestressing the steel wire spiralled around the concrete, the tension set up by internal pressures is more than canceled out; thus walls of prestressed concrete require much less steel and concrete than conventional designs.

A water tank built for Kansas City, Kansas has a diameter of 180 ft. and a liquid depth of 19 ft. 6 in. Quite comparable is the circular prestressed structure proposed for a shopping center at Beverly, Mass., with a dome 220 ft. in diameter, which frees the interior of columns.

In building prestressed concrete tanks, the walls are first poured, then high tensile wire is machine-stressed around the outside, after which the wire is covered with gunite. It is possible to have very thin domes because of the tremendous squeezing force around the top. The dome can be thinner with respect to its volume than the thickness of an egg shell in relation to the volume of the egg.

A prestressed concrete bridge, the Walnut Lane Bridge, is soon to be built over Paper Mill Creek Valley at Philadelphia, Pa. It will have a main span of 160 ft. Depth of the girders will be 6 ft. 7 in.; distance between them will be 4 ft. 4 in. Maximum unit stress in the concrete will be 2000 psi and working stress in the steel wires will be approximately 125,000 psi.

Manufacture of large diameter prestressed pipe. In contrast to tank construction, the pipe itself rotates on a turntable, tensioning the wire as it is spiralled

Photos courtesy of The Preload Corp.

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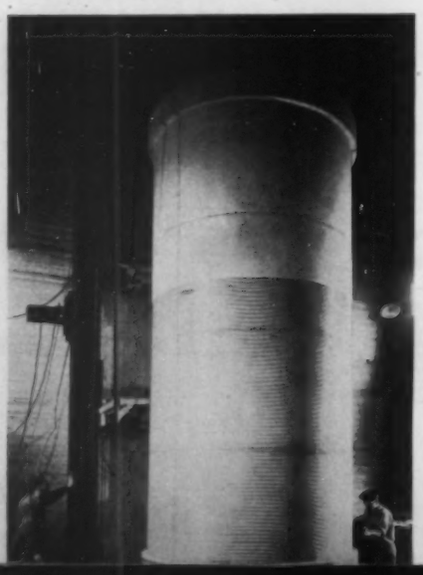


Conclusion

Architects who become familiar with the remarkable properties of prestressed concrete can exploit its possibilities in graceful and delicate structures. It is essentially an engineering material as compared to ordinary concrete because the calculation of internal stresses is more positive, resulting in economies of steel and concrete. Most ordinary concrete buildings are over-designed in parts and under-designed in others.

In addition to prestressed concrete bridges, factory construction, airplane landing strips, top blankets for old roads, crackproof floor slabs, pipes and tanks, we probably shall see its application to retaining walls, crackproof exterior walls for buildings of all kinds, precast floor slabs, precast tubular piles and prefabricated building parts for dwellings. Nor are all these developments going to wait for a purely economic impetus, although figures show in certain types of construction, prestressed concrete offers substantial savings in cost over conventional designs. In any event, prestressed concrete will find its place in the architecture of the United States in the near future. Already there exists a great deal of interest in it, and we shall see more and more engineers and architects collaborating to find new release for their imaginations in its unique properties of lightness and elasticity, in its possibilities for prefabrication and its freedom from cracking.

PURIFYING AIR WITH GLYCOL VAPOR

Two methods of purifying air have been developed in recent years, one by means of ultra-violet radiation, the other by means of germicidal vapors. Both kill air-borne pathogens, but it is impossible to evaluate them comparatively since experiments and tests have not been made on comparable bases. This discussion deals only with germicidal vapors, which have been developed more recently and about which less has been published.

RESEARCH and accidental discovery have both played a part in bringing to its present state our knowledge of the germicidal action of glycol vapors, and in the design of the present compact equipment. In 1939, a group of air conditioning engineers perfected the glycol method of dehumidifying air, in which air to be treated is passed through triethylene glycol, a material that resembles alcohol chemically; is physically much like glycerine; and in vapor form is odorless, tasteless, non-toxic to people and animals, and without effect on fabrics, woods, metals, paper, books, etc. Triethylene glycol is hygroscopic; that is, it has a great affinity for water — hence its use as a dehumidifier.

An early installation for this purpose was made in a New York bank; there a remarkable decrease in absences due to colds and other respiratory infections was noted. Upon investigation, the engineers found that British doctors were, at about the same time, having some success in purifying the air of London's air raid shelters by spraying them with hexylresorcinol, a known germicide, dissolved in propylene glycol, a chemical cousin of triethylene glycol. In this country, Dr. O. H. Robertson of Chicago was trying to reduce the method's cost by cutting down the amount of hexylresorcinol; soon he found that the glycol alone, without the proved germicide, was even better than the combination. This explained the effects of glycol dehumidification in the New York bank.

During World War II Dr. Robertson was appointed Chairman of the U. S. Army Commission on Air-Borne Infection, Board for the Control of Influenza and Other Epidemic Diseases. Out of his and his associates' activities then

The recently discovered germicidal properties of glycol vapor on air-borne bacteria and viruses are put to work through use of this compact vaporizer, suitable for large buildings, which introduces a controlled amount of the vapor into air streams of air conditioning or forced air ventilating systems. The vaporizer treats up to 20,000 cfm of fresh air

and subsequently, and with the participation of the engineers who had perfected glycol dehumidification, has come our knowledge of, and equipment for, air purification with glycol vapor.

How the Vapor Acts

To understand why and how glycol air purifying equipment acts, some knowledge of the way the vapor behaves is helpful. There are several disinfectants more lethal to pathogenic organisms — bacteria and viruses — than the glycols. However, it seems that many germicides have no particular affinity for water and that moist bacteria in the air are little affected by their vapors; although in liquid form they attack bacteria readily. On the other hand the glycols, attracting and being attracted to the minutest amounts of moisture, penetrate a moist microorganism readily and destroy it.

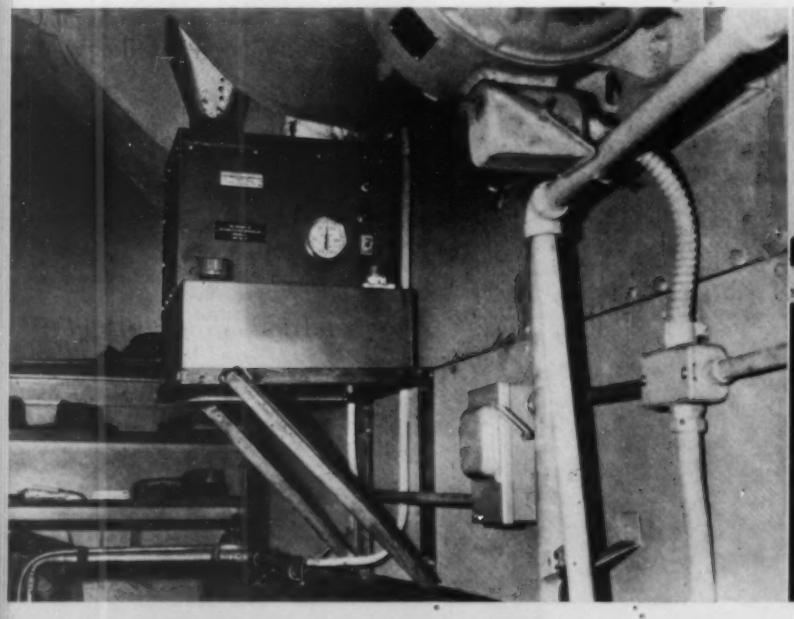
In some circumstances the glycols do not perform with full effect. In a dry atmosphere such as that of an ordinary steam-heated room, pathogens become dry — desiccated, to use the exact word — after a few hours and are then quite resistant to glycol vapor until they are re-humidified. This is done by raising the relative humidity to 35 to 40 per cent. Bacteria which have settled to the floor or other surfaces and are later dispersed as dried particles by sweeping or bed-making are even more resistant. Thus sterilization of the air of inhabited rooms is not completely possible; but air-borne bacteria can be reduced by 70 to 75 per cent, which is sufficient to lower the incidence of acute respiratory infection to a negligible minimum. When to the glycol treatment simple dust-control measures are added — oiling for wood floors, oiled sawdust or oil-mopping for smooth, non-porous floors, oil-emulsion rinsing of bedclothes during washing — tests have disclosed much greater effectiveness; for instance, up to 95 per cent of air-borne streptococci destroyed. In many cases, partially desiccated bacteria are killed; strong germicidal action has been found with a relative humidity as low as 20 per cent.

The pathogens are killed rapidly. In a test of one installation, bacteria were sprayed into a glycol-treated hospital ward. Most of the bacteria — 85 per cent — were killed as the spray was being injected.

It is essential that the glycol vapor be thoroughly dispersed throughout the treated area. It will not disperse of its own accord; circulation of the vapor has to be forced. This implies an air conditioning system, with the vapor introduced into the air stream; or some other means of liberating the vapor in the air to be treated and then inducing a draft. (Small portable glycol vaporizers have recently been developed, about the size of a table radio, which have no fans or other draft-inducers, to purify the air locally.)

Cost of the glycol required is low because it is effective in extremely low concentrations. Propylene glycol is effective in concentrations as low as one part of glycol in eight million parts of air. Triethylene glycol is equally effective in one part to four hundred million parts of air — the actual quantity of vapor in the air is less than 1/100 of the quantity of neon, a rare gas, in the air we breathe every day. An air conditioning system using 15,000 cu. ft. per minute of fresh air would need only 5 oz. of triethylene glycol per hour; all the air in a building covering a full city block, six stories high, could be steril

The commercial glycol vaporizer can be installed in various ways, just so there is a pressure difference between inlet and outlet sides to draw out the vapor. The unit, left, is installed on the suction side of the conditioner fan; the other is across conditioner coil



ized by one pint. Of these two effective glycols, triethylene is preferred.

In theory, the air in a hermetically sealed space might be treated once and maintain its sterility forever; in practice, this is impossible. Air leaks in and out of rooms even when doors or windows are not opened; regulated quantities of fresh air are added to recirculated air in air conditioning systems. Hence glycol vapor is added to the air stream coming from the conditioner in amounts regulated according to the quantity of fresh air added. In current practice, the glycol reservoir of a vaporizer requires replenishing about once a month.

Temperature and relative humidity of the treated air, as well as glycol concentration, have a bearing upon the effectiveness of this method of air purification. It is most effective at temperatures between 50 and 85 F, at relative humidities between 20 and 65 per cent, and at glycol saturation of at least 30 per cent; 65 per cent saturation is commonly employed. These are normal conditions for comfort; it will be seen that the requirements are not critical. The only possible objection to glycol vapor is principally esthetic; in very cold weather it may condense on window panes.

Equipment Characteristics and Installation

Vaporizing the glycol is the only critical operation; it demands special equipment; though simple, the vaporizer functions with precision. The standard model contains a glass-fiber wick which draws glycol from the reservoir across a heating element. In this fashion it converts liquid glycol into vapor without overheating, which would cause the glycol to decompose. The unit is enclosed in a casing 15 in. wide, 15 in. deep, and 17 in. high, weighs 40 lb. empty and 85 lb. full, holds 5 gal. of glycol, and is supplied wired for 230 volts (using 4.2 amps); wiring can be changed to 115 volts (8.4 amps), and both AC and DC models are available.

The vaporizer contains no moving parts; instead of a fan to draw air across the vapor stream, it depends upon the difference in air pressure between the inlet and outlet sides of the conditioner fan. A pressure differential of at least .10 in. water is required. The air inlet to the vaporizer, 3 in. in diameter, need only be airtight. The outlet duct must be watertight, is preferably pitched back to the vaporizer to avoid collecting possible condensation, must be heat-insulated, and if longer than 24 in. should be heated to prevent condensation due to heat lost in the duct. Inlet air should be filtered, either at the vaporizer or in the air conditioning system. The unit is preferably located on a stand or rack, not in direct contact with a floor, and with its front readily accessible for filling and for reading gages. It may be placed within the duct system, in a plenum, if a few simple precautions are observed; or it may be placed outside the ductwork. In any case, it is considered better to locate the unit on the suction side of the fan so the pressure drop will be sufficient for operation; however, for exceptional situations, it can be placed "across" the fan or on the pressure side if enough pressure differential or air velocity can be maintained.

Applications, Test Installations

Apparatus of the kind described has been installed in many types of buildings, including schools, offices, food processing plants, theaters, premature baby wards, pediatric wards, contagious disease wards and pharmaceutical plants. In drug manufacturing it is used to aid production of streptomycin and penicillin, and wherever sterile techniques are required.

Test installations have demonstrated the efficacy of glycol vapors. In two similar pediatric wards at a New York hospital, with fairly close spacing of the beds and some direct intercommunication of the patients, it was found that the children had over 30 cases of cross-infection in a non-glycolized ward, as opposed to two cases in a glycolized ward.

Two University of Pennsylvania pediatricians, Drs. Harris and Stokes, used glycol vapors at the Children's Seashore Home at Atlantic City. Over a period of three winters, there were only 13 cases of acute respiratory infections in the glycol-treated wards as compared with 10 times as many in the non-treated ones.

In a controlled test conducted at the Lockheed Aircraft Plant at Burbank, California, there were half the number of absences caused by respiratory infections in a glycol-treated area housing about 1000 employees as in a non-treated area with the same number.

At the Seamen's Bank for Savings in New York, where the air conditioning engineers discovered the germicidal properties of triethylene glycol, the average absence rate before the installation of glycol was about six per cent. It has since dropped to an average of two per cent.

The effects of glycol on reduction of respiratory diseases were studied in some military barracks during the war. For the first three weeks after new personnel entered the treated area, the disease rate remained the same as in the untreated area. However, during the second three-week period, there was a 65 per cent reduction in the glycol-treated barracks.

For domestic and office use, the portable model, previously mentioned, is available. This small unit — it weighs only 10 lb. — looks something like a table radio and contains a roll of paper saturated with triethylene glycol. When put into operation by plugging into any 110-volt, 60-cycle, AC outlet, the unit's paper strip unrolls slowly over a small heater, which evaporates the glycol. The paper needs replacing about once a month, and total operating costs are about $1.50 per month. The machine can purify the air of an ordinary room in a house, office, or hospital (up to a space as large as a 6-bed ward).

Future Possibilities

Not only are new models of the essential equipment likely to be produced; air purification with glycol vapor has demonstrated one characteristic which, although its value has not been thoroughly substantiated, is of tremendous potential importance. This is what has been called its "hangover" effect, which is not yet wholly understood and whose reliability, therefore, may vary. But apparently those who are exposed to glycol vapor for only a part of their daily routine develop greatly increased resistance to infections at all times, whether there is glycol vapor present or not. The current opinion is that the treatment of the air produces an antibiotic effect in the serum of human blood. There are other theories; whichever is correct, the result is improved health.

HEATING SYSTEMS FOR HOUSES

1 — One-Pipe Steam Systems: Design, Radiators

First of a series on heating systems for residences and other small buildings, covering steam, hot water, and radiant methods, prepared for ARCHITECTURAL RECORD by William J. McGuinness, Prof. of Mechanical and Structural Engineering, Pratt Institute.

Characteristics

While comparative installation costs vary periodically and according to geographic location, a one-pipe steam system is generally cheaper to install than a hot water system or a good forced-warm-air system. While its operating cost may be slightly higher than these systems, one-pipe steam is economical, rugged and easy to maintain. If well designed and maintained, and if boiler water is kept hot by an aquastat, it is prompt to respond to a call for heat. When rooms are at temperature or when outside temperature increases, it shuts off promptly and does not have any troublesome "carry-over" heating such as may occasionally be encountered in other systems.

Design

The first step in design of any heating system is determination of hourly heat losses in Btu from each room or space. Since each square foot of free-standing cast iron steam radiation emits 240 Btu per hour, it is necessary only to divide hourly heat loss by 240 to arrive at the amount of radiation needed. From the accompanying tables the designer may select a radiator of proper size to make up heat loss and to fit space available.

Pipe sizes are fixed by the amount of radiation served. They can be selected from the table given herein, keeping in mind that they fall into three categories: (1) mains; (2) runouts, risers and radiator connections; and (3) returns.

Not of least importance in general design is a space layout of the system to insure proper operation and architectural suitability. Good operation suggests adequate height from boiler to start of main, pitch of all pipes, proximity of radiator to riser, proper location of all air vents, space for servicing boiler, location of radiators below glass areas, and use of two or three radiators in large rooms. Space requirements include recessing of radiators if possible, maintenance of basement headroom and location of piping to permit finishing of basement rooms.

Maintenance

It is difficult and expensive to boil greasy water. New installations should have boiler and piping cleaned and blown out thoroughly after a short period of operation. Water should be drained and refilled, and the stack cleaned, yearly. Radiator control valves must be kept tight to prevent steam leakage into rooms. Air vents on radiators and mains must exhaust air quickly or heating will be slow and expense increased; this or the passing of steam may indicate need for their replacement. In the case of oil burners, efficiency tests are now quite standardized and easy to make. Taking stack temperature and analyzing flue gases will indicate whether combustion is complete and efficient. A slight adjustment in air intake, draftostat, etc., may result in great savings.

(*Continued on page 151*)

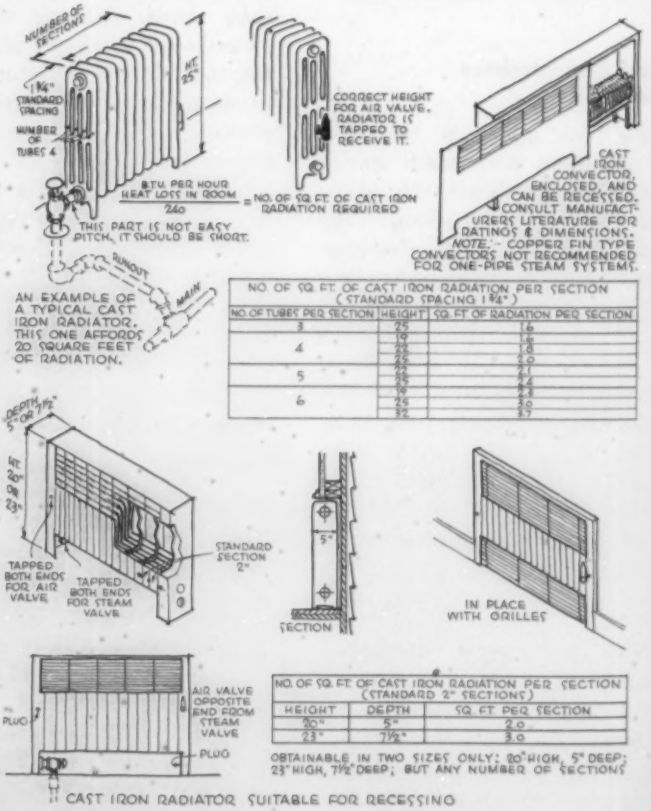
CAPACITIES OF PIPE IN SQ. FT. OF RADIATION

PIPE SIZE (inches)	STEAM MAIN** (Condensate and steam flowing in same direction)	RUNOUTS, RISERS, RADIATOR CONNECTIONS*	WET RETURN
1	—-	28	700
1¼	—-	62	1200
1½	—-	93	1900
2	386	169	4000

Courtesy Institute of Boiler and Radiator Manufacturers

* If runout to radiator exceeds 8 ft. in length increase pipe one size.

** Based on "Equivalent Length" of 200 ft. To determine equivalent length add to actual length (boiler to farthest radiator) 4.3 ft. for each elbow and 8 ft. for each tee.


NUMBER OF SECTIONS
HT. 25"
2¼" STANDARD SPACING
NUMBER OF TUBES 4
BTU PER HOUR HEAT LOSS IN ROOM / 240 = NO. OF SQ. FT. OF CAST IRON RADIATION REQUIRED
THIS PART IS NOT EASY PITCH, IT SHOULD BE SHORT.
RUNOUT
MAIN
AN EXAMPLE OF A TYPICAL CAST IRON RADIATOR. THIS ONE AFFORDS 20 SQUARE FEET OF RADIATION.
CORRECT HEIGHT FOR AIR VALVE. RADIATOR IS TAPPED TO RECEIVE IT.
CAST IRON CONVECTOR, ENCLOSED, AND CAN BE RECESSED. CONSULT MANUFACTURERS LITERATURE FOR RATINGS & DIMENSIONS. NOTE:- COPPER FIN TYPE CONVECTORS NOT RECOMMENDED FOR ONE-PIPE STEAM SYSTEMS.

NO. OF SQ. FT. OF CAST IRON RADIATION PER SECTION (STANDARD SPACING 2¼")		
NO. OF TUBES PER SECTION	HEIGHT	SQ. FT. OF RADIATION PER SECTION
3	25	1.6
	19	1.6
4	25	1.8
	32	2.0
5	25	2.1
	38	2.4
6	19	2.3
	25	3.0
	32	3.7

NO. OF SQ. FT. OF CAST IRON RADIATION PER SECTION (STANDARD 2" SECTIONS)		
HEIGHT	DEPTH	SQ. FT. PER SECTION
20"	5"	2.0
23"	7½"	3.0

OBTAINABLE IN TWO SIZES ONLY: 20" HIGH, 5" DEEP; 23" HIGH, 7½" DEEP; BUT ANY NUMBER OF SECTIONS

CAST IRON RADIATOR SUITABLE FOR RECESSING

TYPES OF RADIATION

PRESTRESSED CONCRETE BLOCKS FORM LARGE PANELS AND SLABS

Developed to speed construction while reducing the cost of building permanent concrete structures, *Strestcrete* is a slab system for roof and floor construction and tongue and groove siding utilizing machine-made blocks of either lightweight or regular concrete pressed together by prestressed steel.

Units are cured and then assembled at the source of manufacture to length and width desired, with steel stressed against the blocks to carry required load from support to support without vertical shoring.

In assembling units into slabs, steel is prestressed to approximately the stress required in the designed loading of the roof or floor section so that the slabs at full load will have little or no deflection under all conditions.

End washers of steel are used at both ends of the assembled slabs and the steel is stressed against these washers, forcing the blocks together, so that the concrete panels can be welded to the steel frame with a positive type of connection and the building is given a very large factor of rigidity.

The slabs are pre-assembled with blocks precision-made by vibrating machine methods into required sizes; the blocks are cured in high temperature kilns, followed by a period of yard seasoning. After complete curing, bearing edges are precision ground to insure attainment of the full bearing of each unit and avoid reduction in the ultimate compression strength figured on each.

Compression is achieved by assembling the ground units on a precision makeup table in a horizontal position and prestressing with threaded tension rods placed in pre-formed grooves on the two edges of the floor or roof unit. Torque wrenches are used to measure tension on steel, so that all necessary reinforcement is taken care of and no additional placement of steel is required on the job.

Use of Strestcrete floor and roof slabs, which are laid in place by a crane, is said to permit simultaneous production of ceiling and floor, ready for almost immediate finishing, and to provide an immediate working platform for other craftsmen to start placing plumbing, electrical fixtures, etc., even while the space between slabs is grouted.

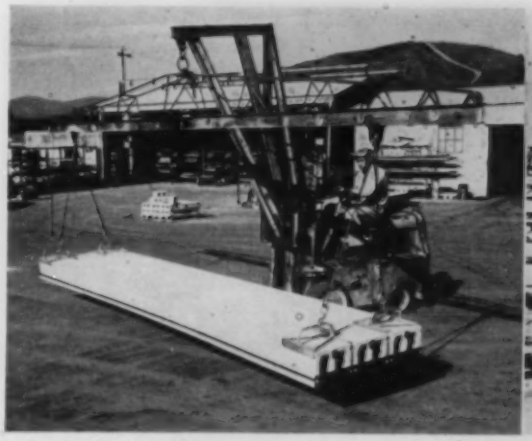
Strestcrete is reported to be practical for roofs in slabs that span up to 32 ft. Tongue and groove siding panels, which are attached to steel framework by welding, and floor and roof slabs come in various thicknesses from 3 to 12 in., assembled in widths up to 8 ft.

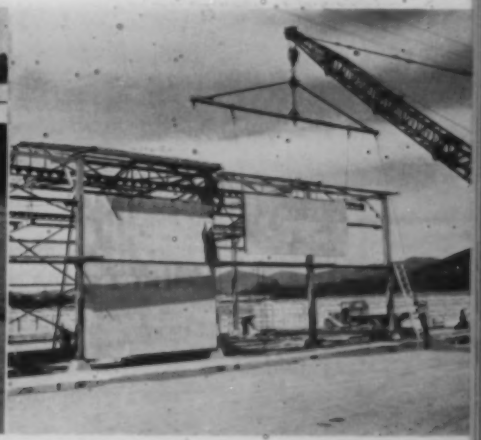
Strestcrete is patented by the Basalt Rock Co., which is currently licensing other concrete products manufacturers to produce Strestcrete Products throughout the United States and Canada: The company's plants are in Napa and Stockton, Calif., with main office in Napa.

(*Continued on page 176*)

At right, above: Strestcrete roof slab on home in Sacramento, where 2000 ft. of roof were laid in 3½ hrs. Above, at left: roof trusses with Strestcrete roof slabs in place waiting to be grouted. Panels are lifted into place by use of a crane and attached to steel framework for welding. No purlins are used. For roof construction, slabs that span 32 ft. are reported to be practical. Slabs and panels are assembled to specified dimensions

Below, left: assembled slab section being transported to stock pile. Slab is composed of machine-made units of either light or regular weight concrete secured together by prestressed steel. Below, right: panel of Strestcrete tongue and groove siding being placed by crane. Section spans 16 ft. 3 in., and is 6 ft. 8 in. high. Minimum of concrete grout is poured between slabs as a joist to cover steel and key slabs together





MANUFACTURERS' LITERATURE

Paint

Engineered Painting. New booklet on functional use of color takes up how "Engineered Painting" works with light to increase profits, helps put color planning on a sound, practical basis, provides paint-on-the-wall at least cost. Some of the points covered are: importance of knowing light intensities, reflective power of paint, reducing brightness contrasts, safeguards in choice of colors, facts about the quality of colored paints, safety at the machine, safety through piping identification. 25 pp., illus. U. S. Gutta Percha Paint Co., Providence, R. I.*

Waterproofing

Exterior Waterproofing Manual. Information on the specification, method and amount of application, costs and other pertinent data for an invisible, one-coat, Silicone masonry water repellent. Sections on all masonry materials such as brick, stucco and concrete cover the specific application procedures for the proper waterproofing of each. 29 pp., illus. Wurdack Chemical Co., 4952 Fyler Ave., St. Louis, Mo.

Lighting Equipment

Light — Cold Cathode, Slim Line, Designed Lighting. Tabulates electrical characteristics of cold cathode and slim line lamps. Gives basic methods for calculating number of lamps to get desired illumination. Pictures open, covered (plastic or glass) and louvered fixtures for cold cathode and slim line lamps. 17 pp., illus. Marlou Lights, Inc., Fanwood, N. J.

Gotham Architectural Lighting. Catalog on trough-type fluorescent fixtures, *Downlites* and *Formlites* for overall and accent lighting. The *Fluor-O-Troughs* are designed for various locations and arrangements with provision for incandescent units; lenses, diffusing glass or louvers can be used. Downlites for use with incandescent lamps are shown in styles for general illumination or accent lighting. The Formlite is shown in four variations of its basic shape and in various mounting arrangements. Dimensions and wattages are given along with diagrams. 8 pp., illus. Gotham Lighting Corp., 548 W. 22nd St., New York 11, N. Y.*

(1) *Creating the Spectacular;* (2) *Originals by Kurt Versen.* The first illustrates and describes a line of incandescent fixtures for accent and general lighting in department stores, showrooms, reception rooms, etc. Units are shown for spotlighting, high and low level illumination; several have adjustable control to spread the light as desired. The second is a portfolio of portable and pin-up lamps. 8 pp. and 12 pp., illus. Kurt Versen Lamps, Inc., Englewood, N. J.

Wood Sealer

Rez for Industrial Wood Finishing. Report describing uses for and methods of applying a clear, synthetic resin sealer developed to make wood dimensionally stable, minimizing grain raise and promoting uniform finish. 8 pp., illus. Monsanto Chemical Co., St. Louis 4, Mo.

Thermal, Acoustical Insulation

Fiberglas Aerocor. Describes qualities of blanket-like insulation made of superfine glass fibers. The blankets have a density of from 0.3 to 1 lb. per cu. ft., and come in thicknesses from ½ to 2 in. and widths from 18 to 72 in. Physical qualities and product specifications are tabulated. 8 pp., illus. Owens-Corning Fiberglas Corp., Toledo 1, Ohio.*

Fire Stations

Fire Station Design. A symposium of ideas, plans and sketches for better housing of fire fighting equipment and personnel, contributed by architects, fire chiefs and technical writers of the fire service. Contains drawings of approximately 35 one- and two-story fire stations in a wide range of sizes to meet almost any building appropriation. This is the second edition of a publication first issued two years ago. 36 pp., illus. Circul-Air Corp., 575 E. Milwaukee, Detroit 2, Mich.

Attic Fans

Attic Ventilation Code. Second edition of this code has been rewritten to include new material such as: illustrations of typical discharge openings, method of computing areas for attic fan discharge vents, and minimum air changes recommended for attic ventilation systems. Propeller Fan Manufacturers Assn., 2157 Guardian Bldg., Detroit 26, Mich.

Wood Specifications

Southern Pine Dimension — Its Properties, Grades and Uses. Contains useful tables of joist sizes for various spans and grades, deflection limitations, rafter spans for various roof loads, data on built up girders and trussed rafters. Describes various grades and uses of Southern Pine Dimension (lumber of 2-in. nominal thickness) and discusses texture and properties, stress grading and seasoning. 12 pp., illus. Southern Pine Assn., New Orleans, La.

Metal Framing

Unistrut Catalog No. 500. Detailed information on how to frame, hang and support electrical, plumbing and heating and air conditioning equipment. Shows variety of channels, clamps, brackets and fittings. Points up method of connecting channels that requires no welding, drilling, and provides complete adjustability. Pictures typical installations. 24 pp., illus. Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill.

Paging Systems

Autocall Paging Systems. Kit of information on time- and money-saving advantages of paging systems for manufacturing plants, offices, hospitals and institutions. Covers several sizes of bells, chimes, whistles, horns and various models of Autocall Central Sending Stations. The Autocall Co., Shelby, Ohio.*

Hardwood Insulation

Avoid Cold, Damp Floors with Rubatex Insulation Hardboard. Tells how basementless houses and similar structures can be insulated against condensation and heat loss with an insulation made of synthetic rubber containing individually sealed bubbles of nitrogen. Describes characteristics of product and contains detailed construction diagrams. Specifications are included. 6 pp., illus. Great American Industries, Inc., Rubatex Div., Bedford, Va.

Kitchen Cabinets

Kitchen-Kraft Customized Steel Kitchens (No. 45B). Illustrates and gives dimensions of a complete line of steel cabi-

(Continued on page 190)

* Other product information in Sweet's File, 1949

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LOW BRIGHTNESS

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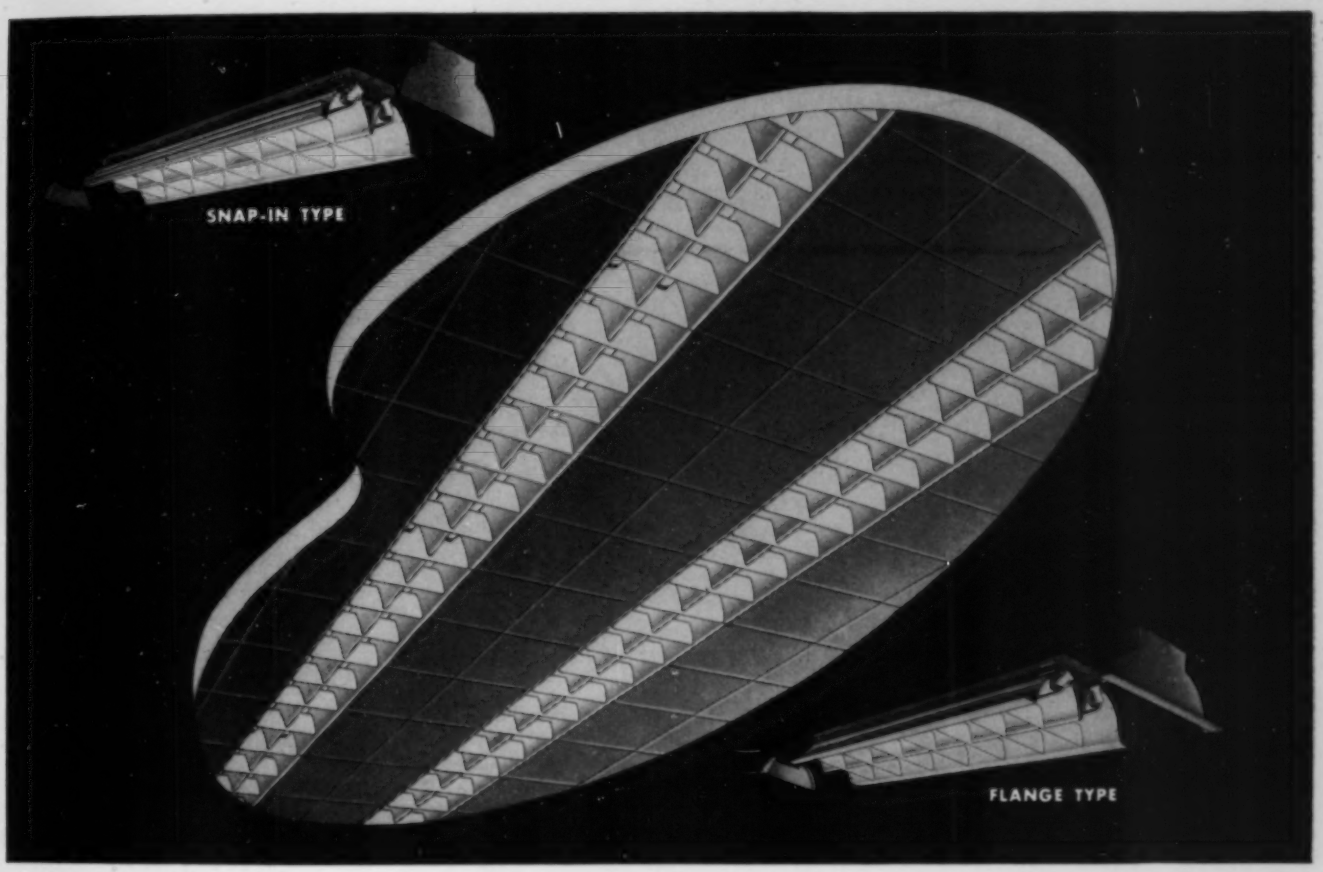

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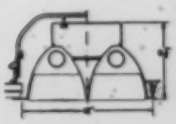

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DAY-BRITE *Lighting*

339

FITZGIBBONS heats the big jobs!

The famous Atlantic City Steel Pier has FITZGIBBONS "D" Type Steel Boilers

It is only fitting that the show place of the nation should be served by steel boilers of nation-wide fame for their outstanding fuel economy and reliable performance. With Fitzgibbons "D" Type steel boilers, the Atlantic City Steel Pier offers both comfort and pleasure, in January as well as June.

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HEATING SYSTEMS FOR HOUSES (*Continued from page 146*)

2 — One-Pipe Steam Systems: Boilers and Controls

By William J. McGuinness

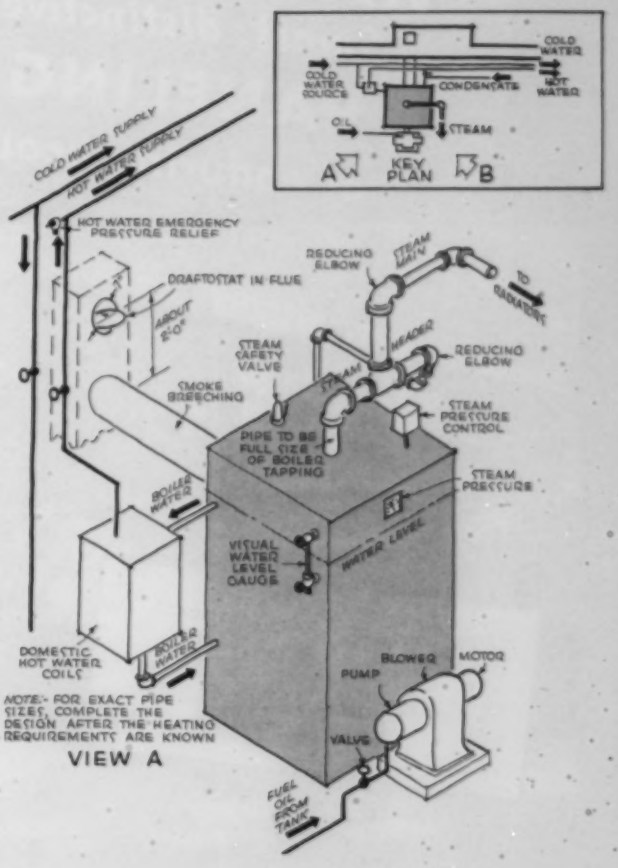
Boiler and Piping

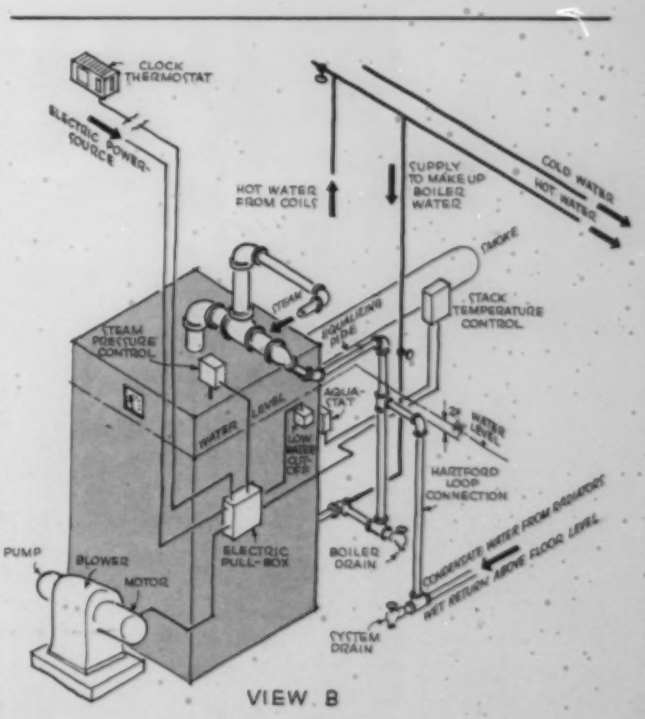
Selection of boiler depends on a number of things besides system capacity, including: whether the boiler is steel or cast iron; kind of fuel (oil, coal or gas); and whether or not generation of domestic hot water is included. Once these are decided, capacity should be calculated to include all radiation, allowance for domestic hot water, and allowances for pickup from a cold start and for loss in pipes. Manufacturers' recommendations should be consulted. Black iron pipe is most common and covering should be provided for mains, runouts and risers in exterior walls. Return lines are not usually covered. The boiler should be well insulated.

Domestic hot water can be produced by coils in a unit adjacent to the boiler as shown here, or by submerged coils within the boiler (both producing continuous flow of hot water); or smaller coils can be used to supply a storage tank for intermittent use. The former method is now the more popular.

Controls

In this system, **valves** at radiators must be fully open or fully shut. A small opening will cause hammering between steam and condensate. The **pressure control** shuts off the oil burner when steam pressure becomes excessive. High steam pressure will also operate the spring-loaded **safety valve** and afford a mechanical relief. The **aquastat** is adjustable to maintain boiler water at a temperature high enough to produce domestic hot water. It will turn the oil burner on and off to accomplish this. An additional advantage of this control is that when heat is called for the boiler water has a start and need not be heated up from a very low temperature. The **clock thermostat** turns the oil burner on and off to maintain an optimum temperature in the heated space. The clock attachment changes this temperature between day and night. The **low-water cutoff** will stop the fire if the boiler water level drops, saving the boiler from burning out. The **stack temperature control** will stop the oil pump and blower if the burner has failed to ignite within a time limit. The **oil burner switch** at the head of the basement stairs will cut off the system when a shut-down is desired. (*Continued on page 153*)





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HEATING SYSTEMS FOR HOUSES

3 — One-Pipe Steam Systems: Mains and Returns

By William J. McGuinness

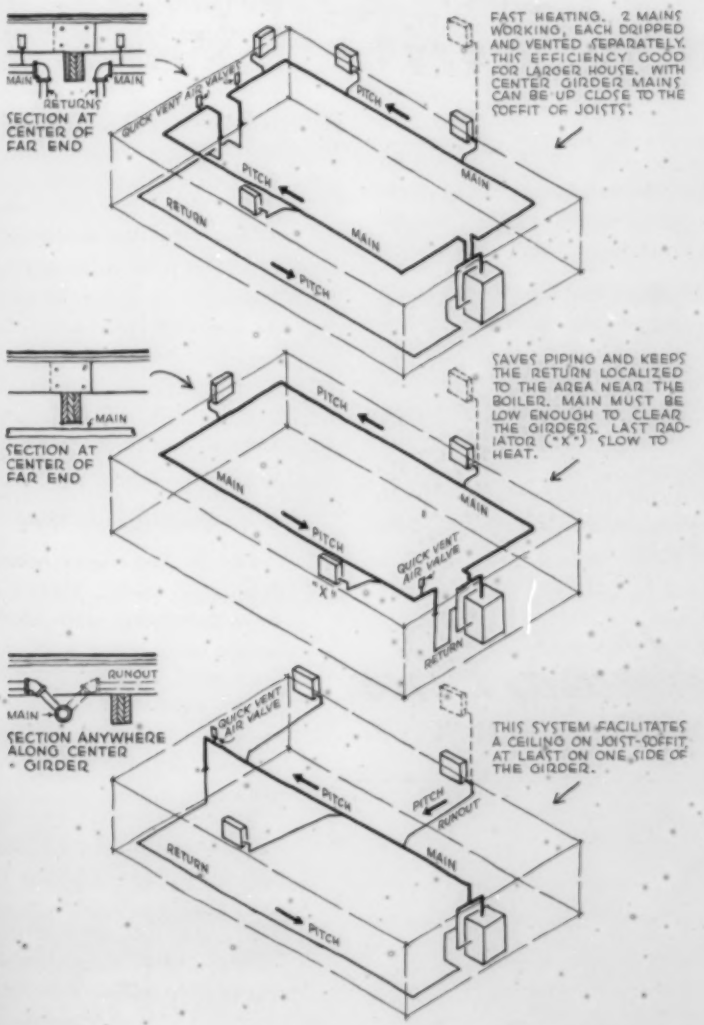
(Continued from page 151)

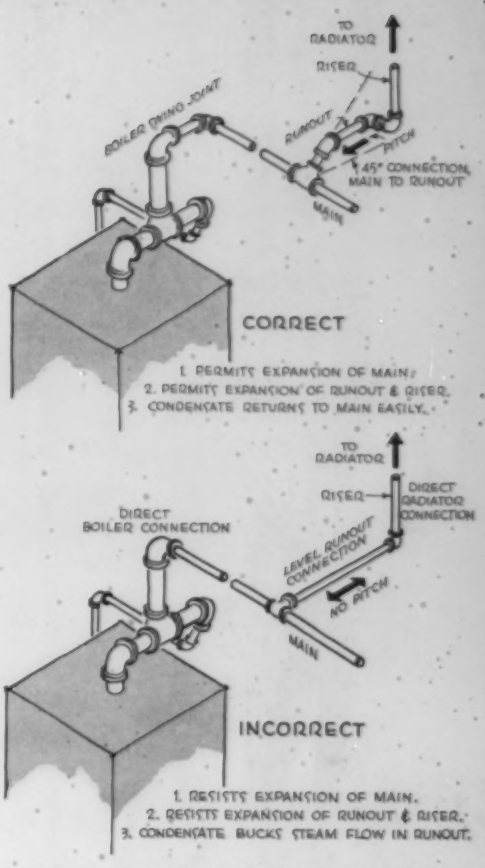
GENERAL NOTES

Pitch mains, returns, and radiator runouts ½″ in 10 ft. Main changes to return pipe size by a reducer, below boiler water level. Quick vent air valves must be at least 15″ away from the vertical drop at end of mains. To prevent boiler water backing into return, a Hartford loop connection should join the return with the equalizing pipe 2″ below boiler water level. Quick vent valves should be placed as high as possible by extending them above the main. It is preferable to connect the supply end of the main to a horizontal header instead of by a vertical pipe to the boiler. Basement radiators are possible only above boiler water level, if drained to a wet return.

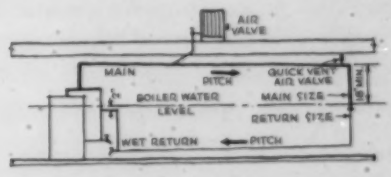
SUGGESTED MAIN LAYOUTS

For small rectangular houses with center girder

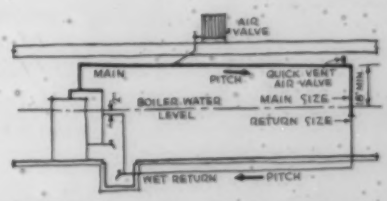

MAIN
MAIN
RETURNS
SECTION AT CENTER OF FAR END
QUICK VENT AIR VALVE
PITCH
MAIN
RETURN
FAST HEATING. 2 MAINS WORKING, EACH DRIPPED AND VENTED SEPARATELY. THIS EFFICIENCY GOOD FOR LARGER HOUSE. WITH CENTER GIRDER MAINS CAN BE UP CLOSE TO THE COFFIT OF JOISTS.
MAIN
SECTION AT CENTER OF FAR END
SAVES PIPING AND KEEPS THE RETURN LOCALIZED TO THE AREA NEAR THE BOILER. MAIN MUST BE LOW ENOUGH TO CLEAR THE GIRDERS. LAST RADIATOR ("X") SLOW TO HEAT.
QUICK VENT AIR VALVE
"X"
RUNOUT
MAIN
SECTION ANYWHERE ALONG CENTER GIRDER
THIS SYSTEM FACILITATES A CEILING ON JOIST-SOFFIT AT LEAST ON ONE SIDE OF THE GIRDER.



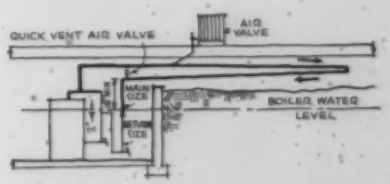
CORRECT AND INCORRECT BOILER AND RADIATOR CONNECTIONS



Usual type; can follow cellar wall near floor.



When return cannot be visible it may be buried in or below slab; coat outside of return with asphaltic paint; do not put return in water-bearing soil or cinders. Pit is required if system is to be drained.



Space limitation may necessitate dry return; do not connect radiator runouts to it unless it is as high as main. Note position of quick-vent valve and minimum height of return above boiler water level.

REASONS FOR THREE KINDS OF RETURNS

PULL UP A CHAIR...

and let Wood tell its story!

There's a *comfort reason* for using wood windows! Sit close to one on a winter day . . . feel how the natural insulating qualities of wood help create comfort by resisting the transmission of cold. In summer you can *feel* that wood windows do not "heat up" readily.

Ponderosa Pine is an ideal wood for windows. Smooth, even-grained, it provides an excellent bonding surface for all finishes. Its low thermal conductivity discourages condensation, resulting in fewer decorating bills. As Ponderosa Pine is a workable material, its use in windows provides maximum flexibility of styling and design combinations. Ponderosa Pine windows are now available, treated at the factory with a scientific wood preservative process. This treatment is in accordance with high industry standards and adds still more years to the long life of wood. Ponderosa Pine Windows are available in modular standard sizes in a wide variety of styles.

for friendly living Ponderosa Pine WOODWORK

Mail the coupon for "Today's Idea House"—32-page Booklet—full of photographs showing how Ponderosa Pine windows, doors and frames create more convenient, more comfortable living.

Ponderosa Pine Woodwork
Dept. SAR-8, 38 S. Dearborn St.
Chicago 3, Illinois

Please send me a copy of "Today's Idea House."
(Please print.)

Name.....

Address.....

City.....*Zone*.....*State*.....

NEWS FROM CANADA

Construction Sky Clear

Speaking recently in Windsor, Ontario, President Allan C. Ross of the Canadian Construction Association said, "We are in the fortunate position of being able to present a much more optimistic picture than that now being reflected in our great neighbor immediately across the river. While several economic indicators in the U. S. have taken a downward trend, including construction activity, Canadian conditions have remained comparatively stable and all indicators point to the maintenance of a high volume of construction."

Mr. Ross drew attention to the fact that contracts awarded during the first five months of 1949 amounted to $386 million compared with $349 in the same period last year. One of the most encouraging features is that the largest dollar-gain has been recorded in the field of industrial construction. "There is currently no evidence," he declared, "to suggest that there should be any revision in the record program of investment which was forecast for 1949 at the beginning of the year."

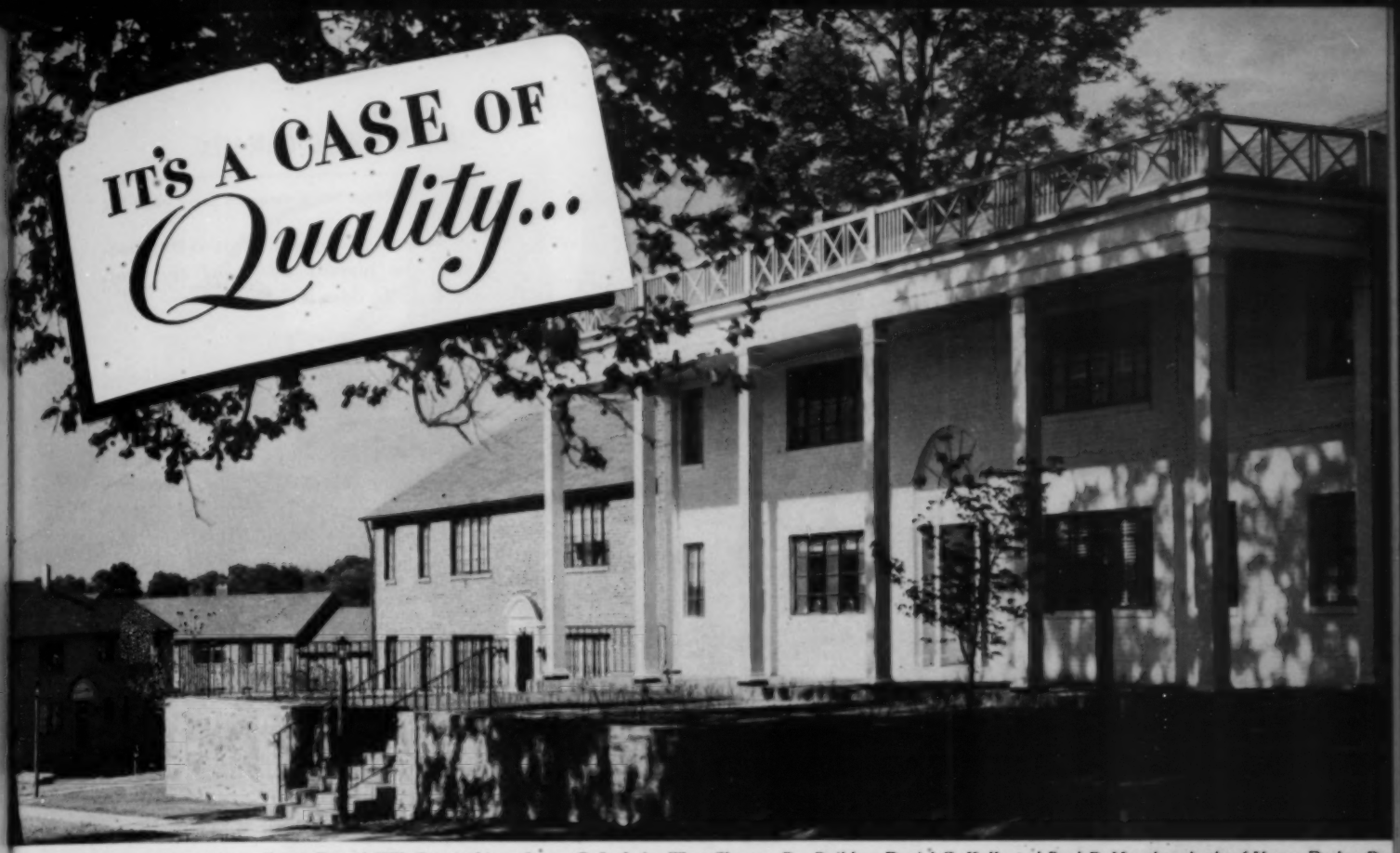
In addition to the maintenance of a high volume of building, the C.C.A. head cited other bright spots. Material supplies continue to improve, thus reducing costs due to delays in delivery. Offsetting this reduction has been the insistence of labor in many areas of further wage increases. Material costs have been holding fairly steady. The net result is that it now appears that construction costs this year are levelling off and will not likely be much higher than they were towards the end of 1948.

Slide Continues in May

Despite the cheery optimism of Mr. Ross (see above), there's considerable brow-furrowing and head-scratching among members of the building fraternity because of an unexpected decline in contract awards. Beginning in April, it has carried into May, narrowing the margin of this year's earlier gain over last to $37 million.

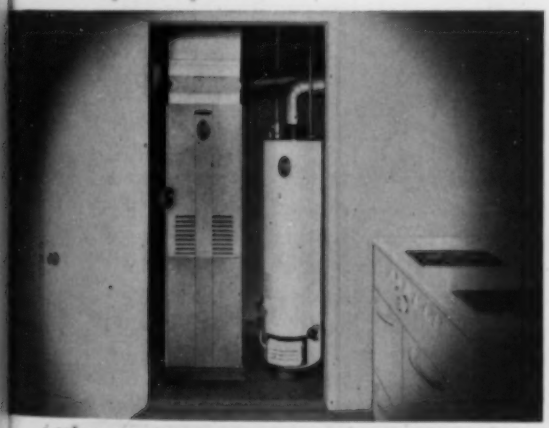
May awards totalled $106 million, topping the hundred million mark for the third time in history. But, as Maclean Building Reports points out, this sum is well below the all-time record set in May, 1948, when contracts amounting to $140 million were let. All classifi-

(*Continued on page 156*)



View of *Drexelbrook*, Drexel Hill, Pa. *Architect:* James G. Ludwig, West Chester, Pa. *Builders:* Daniel G. Kelly and Fred P. Meagher, both of Upper Darby, Pa.

...with 1,223 Personalized heating systems



1,223 APARTMENTS at *Drexelbrook* are equipped with Bryant *Personalized Heating*. Shown are the Bryant Model VS-304 Winter Air Conditioner and Bryant *Red Seal* Automatic Gas Water Heater in closet installation. 50 community laundries also are equipped with Bryant Water Heaters.

New evidence of the ever-increasing acceptance of *Personalized* Heating for apartments comes from *Drexelbrook*, where the Bryant name plate appears more than two thousand times.

This 137-acre wonderland of garden-style apartments is one of the largest and most modern developments of its kind in the world. It is a product of far-sighted planning that provides unsurpassed comforts and conveniences for its occupants.

Bryant *Personalized Heating* stands high on the list of tenant advantages at *Drexelbrook*. Each family enjoys *independent, automatic control* of all heating in its own home. Living areas are never overheated, never underheated. There is always plenty of hot water on tap—at the temperature desired by the user, for each family has its own *individual* hot water service.

Aside from its advantages for occupants of multi-family housing, Bryant *Personalized Heating* also provides these advantages for *management:*

Personalized Heating is maintained at *low* cost; large staffs of janitor-firemen or heating maintenance men are unnecessary and, in most cases, a single custodian is master of *all* equipment. Service or repair, if necessary, is entirely local, handled within a period of minutes and at *minimum* cost. Waste heat is virtually eliminated, and there are few, if any, tenant complaints.

These advantages of Bryant *Personalized Heating* benefit *all* who finance, invest in, build or manage multi-family housing. Ask the Bryant Distributor nearest you to tell you the complete story.

Let the pup be furnace man
... and water boy, too!

bryant

AUTOMATIC HEATING

BRYANT HEATER DIVISION
AFFILIATED GAS EQUIPMENT, INC.
Cleveland, Ohio • Tyler, Texas

"AN AID TO CONSTRUCTION"

says the Drexelbrook construction team, DANIEL G. KELLY, Realtor, and FRED P. MEAGHER, Builder

"Bryant *Personalized Heating* aids construction by affording tremendous space savings. This outstanding equipment provides the same advantages in heating for apartment dwellers as those enjoyed by occupants of individual homes."

A Shower Cabinet designed especially for . . . bathrooms

FIAT

Cadet Built-in Model No. 19-B

Below, view showing lath and plaster construction of door opening.

Here is a moderate cost shower cabinet that is perfectly suited for bathroom installation. The Built-in Cadet shower is completely recessed behind the wall material of the bathroom. Joint around the door opening is covered by the Fiat escutcheon that frames the door and gives a smart trim finish.

Installed cost is considerably less than a built-up tile shower and is considered by many builders as superior in appearance. It makes a permanent water tight installation, will not crack and develop leaks with settling of the building, as often occurs when mortar joints are depended upon for watertightness.

Standard equipment includes metal top and chromium plated dome light.

An important feature is the reversible side panels, valves can be installed on either side without special drilling.

FIAT

GIVE THE BUILT-IN CADET SPECIAL CONSIDERATION FOR YOUR NEXT HOUSE; IT CAN BE MADE A STRONG SALES FEATURE.

FIAT METAL MANUFACTURING COMPANY
Chicago 13, Ill. Long Island City 1, N. Y. Los Angeles 33, Calif.

In Canada—Fiat showers are made by Porcelain and Metal Products, Ltd., Orillia, Ontario

NEWS FROM CANADA

(*Continued from page 154*

cations were down in what is traditionally the highest month of the year. Volume to date is $386 million.

Building Products Star

Construction materials, including plumbing and heating equipment, were featured at the second Canadian International Trade Fair, officially opened in Toronto on May 30 by U. S. Secretary of Commerce, Charles Sawyer.

One Swedish, two British and nine Canadian firms were among the new exhibitors. The Swedish display included a model house illustrating radiated and contract air heating, and the British show was composed of spray guns, blowers, vacuum equipment, motor speed regulators, wallpapers, vitreous enamelled steel fittings, window and door frames of pressed steel, as well as other specialties.

The Canadian exhibits covered kitchen equipment, fireplaces, furnaces, septic tanks, weatherstripping, water distribution systems for farms, factories and golf courses, circulation and conditioning equipment, fibreboard sheathing, plywood products, insulating materials, and prefabricated aluminum houses. As in the case of the first Fair, Czechoslovakia, India and Yugoslavia were also represented in the construction section.

35,000 Helped To Own

Making mortgage loans is a major function of our insurance, loan and trust companies. Last year, reports the Financial Post, the funds they advanced helped 35,000 families realize their aspirations for home ownership. This represented about four out of every 10 houses started in the Dominion. The loans took $150 million from the companies' tills and equalled all other types of mortgage payments combined. Together, they pushed the lending institutions' stake in Canada's real estate future to a new high of $840 million.

Prefabs Go To Newfie

One hundred houses have been ordered from Canadian Prefabrication, Inc., Quebec, by Central Mortgage and Housing Corporation for erection in Newfoundland, Canada's new province. The first shipment of thirty 6-room 2-story dwellings has already been made.

Of modified Cape Cod design, these prefabs are 25 by 24 ft. in area. They employ a combination panel-precut system, and have exterior walls faced with aluminum sheeting.

HE'S UNDER IT- HE'S OUT!

ALZAK

LOOK FOR THIS NAME

It identifies aluminum reflectors made extra bright that won't chip, spall, or peel. Clean them regularly and they will last indefinitely. Leading manufacturers make Alzak reflectors in standard shapes and sizes, in specular and diffuse finish.

Fifty-five feet above left field, this baseball's an easy mark for the fielder's eye. This unretouched picture was taken under actual night playing conditions. It proves the exceptional efficiency and lighting control possible with Alzak reflectors of Alcoa Aluminum.

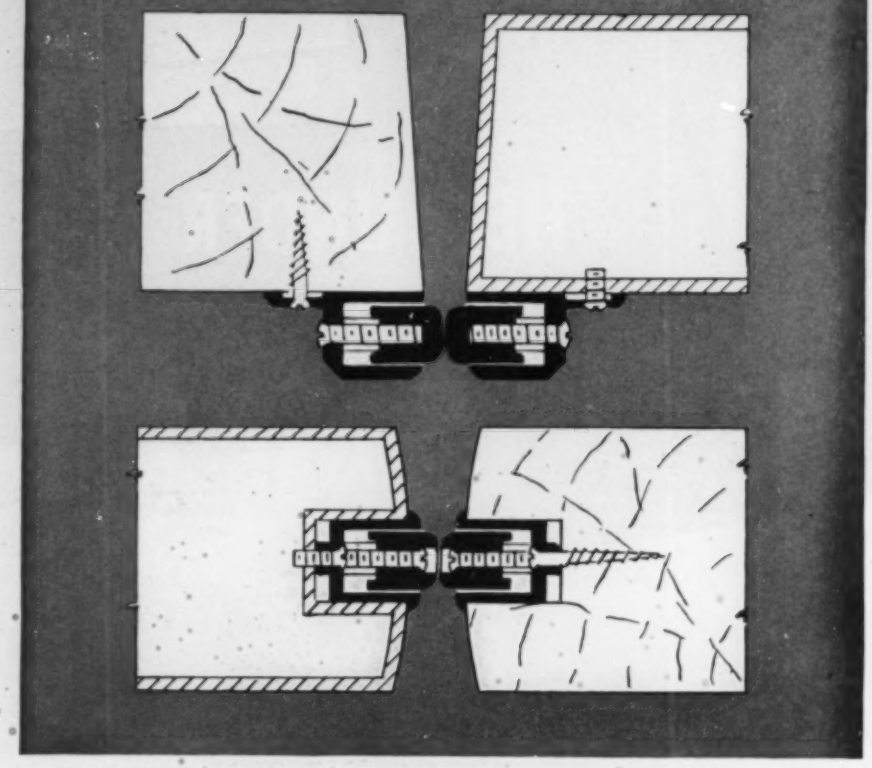
Think of your own lighting. You sink a lot of money into wire, fixtures and current. It's uneconomical to install a poor reflector when Alzak reflectors can give you high lighting efficiency. ALUMINUM COMPANY OF AMERICA, 1474H Gulf Building, Pittsburgh 19, Pennsylvania.

ALZAK REFLECTORS OF ALCOA ALUMINUM

ALCOA ALUMINUM

made by Leading Lighting manufacturers

MICHAELS Astragals



Write today for information and prices on Michaels Adjustable Astragals. Made of extruded bronze, aluminum or nickel, they are simple, practical, rugged, easily installed and adjusted, and available in several styles. Two are shown above. Type A (top illustration) may be applied to either wood or hollow metal bevel doors. Also used as a stop bead. Type E (lower illustration) is for bullnose hollow metal or wood double doors. Both types may be used at the bottom of doors. Michaels Astragals help keep doors closed tightly . . . eliminate drafts and air currents . . . keep out dirt and dust. Write for details. Astragals are only one of many items in the Michaels line. So whatever building product you need, if it's made of metal, we may have it or can make it.

MICHAELS PRODUCTS

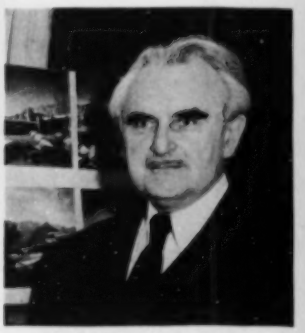
Bank Screens and Partitions
Welded Bronze Doors
Elevator Doors
Store Fronts
Lettering
Check Desks (standing and wall)
Lamp Standards
Marquises
Tablets and Signs
Name Plates
Astragals (adjustable)
Stair Railings (cast and wrought)
Wrought and Cast Radiator Grilles
Grilles and Wickets
Kick and Push Plates
Push Bars
Cast Thresholds
Extruded Thresholds
MJ-CO Parking Meters
Museum Trophy Cases

The MICHAELS ARTS BRONZE CO., INC., 234 Scott St., Covington, Ky.

Member of the National Association of Ornamental Nonferrous Metals Manufacturers

THE RECORD REPORTS

(*Continued from page 22*)



Julius Shulman Photo

Richard J. Neutra

A.I.A. CHAPTER AWARDS

Winners of the Tenth Honor Award Competition of the Southern California Chapter, A.I.A., have been announced. Richard J. Neutra won the Distinguished Award for his design of the Edward J. Kaufman residence. Recipients of the Honor Award were Walter Wurdeman and Welton Becket for their entry, the Western Home Office of the Prudential Life Insurance Company of America. Mr. Neutra also received an Honor Award for his design of the Aloe Medical Supply Building.

Creditable Mention went to William F. Cody; Gruen and Krummeck; Parkinson, Powelson, Briney, Bernard and Woodford; and Ralph Soriano for three of his entries.

Julius Shulman Photo

Welton Becket and Walter Wurdeman

SURVEY PLANNED

A. Whitney Murphy, Architect, of Butler, Pa., has undertaken a five-month survey of the extent and need for city planning in American cities under 50,000 population. The survey will be

(*Continued on page 160*)

Squeeze discomfort right out of the air–with UniTrane

UniTrane air conditioning removes excess *moisture* from the air as well as excess *heat*.

On a hot, rainy day, UniTrane clears the air of extra moisture in a hurry. The Type MC UniTrane unit illustrated below will remove as much as *ten gallons* of water from the room air during a 24-hour period.

UniTrane is not just a new system. It is a new kind of air conditioning. Each room has its own compact, under-the-window unit. Units are designed for temperature control, moisture control, ventilation control. All air is filtered.

No ducts are needed. Just simple piping, like a hot water system. You circulate hot water in winter, chilled water in summer. It's as simple as that.

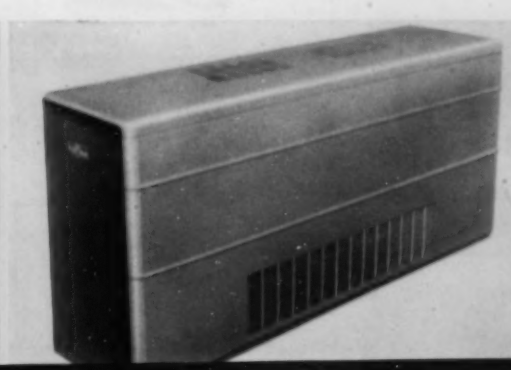
With UniTrane you can *budget* your installation. A zone, a floor, or even just a room at a time can be conditioned, after the basic source of hot water and chilled water has been established.

Read "Merely a Matter of Air" for *non-technical* information about UniTrane. For professional data, see DS-420. These bulletins may be secured through the Trane sales office in your area, or direct from the factory.

THE TRANE COMPANY...LA CROSSE, WIS.

Manufacturing Engineers of Heating, Ventilating and Air Conditioning Equipment — Unit Heaters, Convector-radiators, Heating and Cooling Coils, Fans, Compressors, Air Conditioners, Unit Ventilators, Special Heat Exchange Equipment, Steam and Hot Water Heating Specialities . . . IN CANADA, TRANE COMPANY OF CANADA LTD., TORONTO.

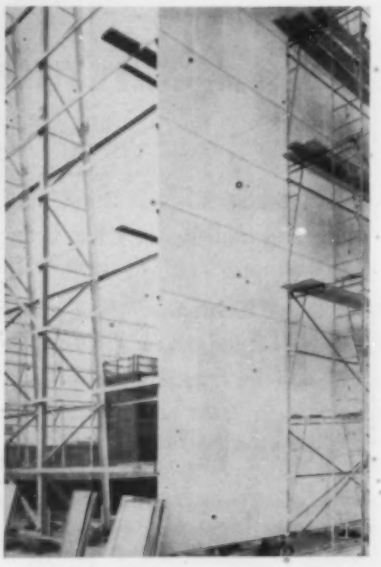
The revolutionary Type MC UniTrane unit shown here has two circuits in one compact cabinet. One circuit controls ventilation and moisture. The other controls room temperature. Now you can have perfect year-around air conditioning in multiroom buildings without using ducts.



GENERAL PETROLEUM BUILDING, LOS ANGELES, CALIFORNIA

for an Harmonious Blend

SEAPORCEL *PORCELAIN ENAMEL* WAS SELECTED



Topping this new magnificent building is an installation of over 24,500 square feet of Seaporcel Porcelain Enamel . . . yes, virtually 30 tons of this mechanically fastened material of permanence and beauty.

Matching the varied shades and textures of this structure's terra cotta exterior, lightweight Seaporcel Porcelain Enamel completes in perfect harmony the impressive dignity of this distinctive new building.

Holes to accept letters and Pegasus figures were burned in by gas torch on the job after porcelain enamel was erected.

FOR JOBS LARGE OR SMALL
SEAPORCEL IS PRACTICAL • EASILY CLEANED
DURABLE • ECONOMICAL • FIRE RESISTANT

Write today for catalogue showing application and current jobs.

SEAPORCEL METALS, INC.
Formerly Porcelain Metals, Inc.
28-06 BORDEN AVENUE, LONG ISLAND CITY 1, N. Y.
Complete A. F. of L.-Metal Fabricating & Enameling Shop
West Coast Representative: McFarland & Co., 1206 West 7th Street, Long Beach 13, Calif.

SEE OUR CATALOG IN SWEET'S
*Reg. U. S. Pat. Off.

Seaporcel
Member Porcelain Enamel Institute, Inc.

THE RECORD REPORTS

(*Continued from page 158*)

executed with funds provided by an Edward Langley Scholarship Grant of the A.I.A. and a William Wirt Winchester Fellowship conferred by the Yale University Department of Architecture in 1941. Mr. Murphy's research will be conducted with the cooperation of Walter A. Taylor, director of education and research of the A.I.A.

PRODUCT LITERATURE AWARDS

The 32 winners of Certificates of Merit in the recent products literature competition, sponsored by the A.I.A. and the Producers' Council, have been announced at a dinner addressed by Harold R. Sleeper. Entries in the contest, which was the first of its kind, were limited to direct-mail literature directed to architects and were judged on the basis of description of products best serving the requirements of the architectural profession. Members of the Jury of Award, which was headed by Mr. Sleeper, were: Francis F. Bulfinch, F.A.I.A.; Harry G. Stewart, A.I.A.; James M. Ashley, of Libby-Owens-Ford Glass Co.; Alex F. Osborn, of Batten, Barton, Durstine & Osborn and H. Judd Payne, Publishing Director, F. W. Dodge Corp.

ILLINOIS OFFICERS

Officers and directors were elected at the 52nd annual meeting of the Illinois Society of Architects. Named directors of the organization were: William Campbell Wright, William Paul Fox, Stanley D. Anderson, Sigurd E. Naess, Elmer C. Carlson and Kenneth A. McGrew. F. M. Bernham was reelected president of the Society; Benjamin Franklin Olson was elected first vice president; Edgar D. Martin was named treasurer and Nathaniel Koenigsberg, secretary.

FRENCH CAMPAIGN

The last week of June was designated "La Semaine de la Plus Belle France" (More Beautiful France Week). Sponsored by the Commissioner General of Tourism and the Urban and Rural League, the campaign to beautify the countryside was carried out by repainting, redecorating and cleaning, landscaping roads, removing unsightly advertisements and by cleaning the approaches to neglected monuments. Contests were held and prizes given for

(*Continued on page 162*)

EFFICIENT SERVICE COMES FIRST in Cincinnati's Terrace Plaza Hotel

135,000 pounds of Revere Copper Water Tube insure efficient service from the Terrace Plaza's hot and cold water lines and air conditioning system.

Cincinnati's new Terrace Plaza Hotel was "conceived and constructed for the sole purpose of rendering guests the most modern conveniences known to science and the ingenuity of man." Every detail of construction was selected for its ability to provide the finest service.

Consequently, Revere is particularly proud that 135,000 pounds of Revere Copper Water Tube were used in the hot and cold water lines and air conditioning system of this carefully-planned hotel.

Revere hard temper tube is furnished in straight lengths of 12 feet and 20 feet. Revere easy-bending soft temper tube is available in straight lengths or long coils. All Revere Copper Water Tube is stamped at regular intervals with the Revere name and the type. These marks are more than identification—they are your assurance of full wall thickness and the close dimensional tolerances so essential for tight soldered joints.

It will also pay you to install such other long-lived Revere materials as Red-Brass Pipe; Sheet Copper and Herculoy for tanks, ducts, pans and trays; Dryseal Copper Refrigeration Tube (dehydrated and sealed); Copper oil burner, heat control and capillary tubes.

Revere materials are handled by Revere Distributors in all parts of the country. The Revere Technical Advisory Service is always ready to serve you. Call your Revere Distributor.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

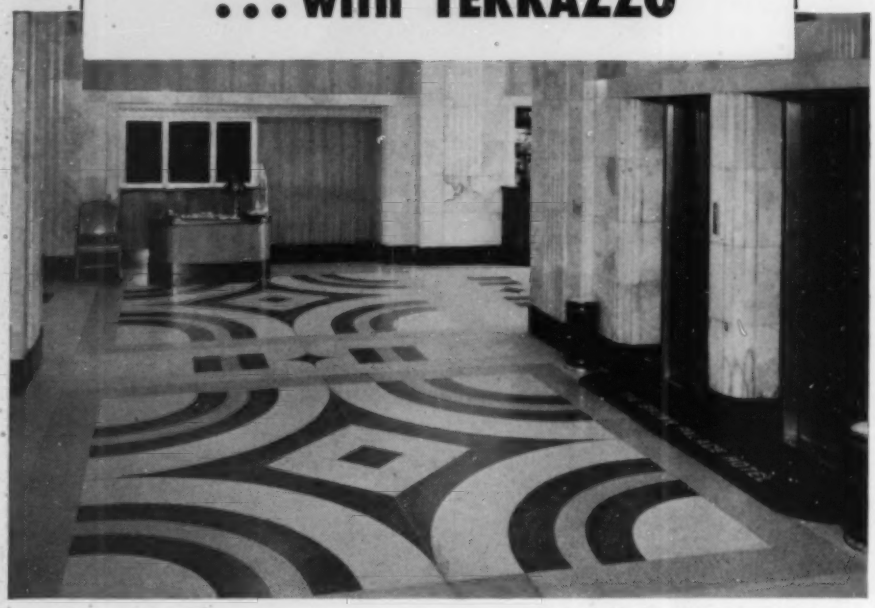
• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

TERRACE PLAZA HOTEL
Cincinnati, Ohio

Skidmore, Owings & Merrill—Architects; Jaros, Baum & Bolles—Engineers; Frank Messer & Sons, Inc.—General Contractor; E. J. Nolan Corp.—Plumbing and Heating Contractors; Carrier Corporation—Air Conditioning and Refrigeration; Mutual Manufacturing & Supply Co.—Revere Distributor.

A Long Life for floors ... with TERRAZZO



Life-long beauty in Terrazzo with ATLAS WHITE CEMENT

Terrazzo makes an ideal floor. It long withstands the traffic of countless feet. Its beauty is ever new. The warmth of colors and beauty of patterns available in Terrazzo floors, made with a matrix of Atlas White Cement, will endure through years of severest service.

Outstanding in both uniformity and whiteness, a matrix of Atlas White Cement shows color-pigments and aggregates at their best, whether in contrast or blend. An infinite variety of rich color tones and shadings is possible . . . not only in Terrazzo, but in Stucco, Cement Paint and Architectural Concrete Slabs.

Atlas White complies with ASTM and Federal specifications. It has the same advantages when used for concrete. Cleaning is easy, and maintenance costs stay low.

For further information *on the uses of Atlas White Cement, see SWEET'S Catalog, Section 4B/3 and 13C/5, or write to Atlas White Bureau, Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N. Y.*

AR-T-15

FOR BEAUTY AND UTILITY

ATLAS WHITE CEMENT

FOR TERRAZZO, PAINT, SLABS, STUCCO

NBC SUMMER SYMPHONY—*Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—June to September*

THE RECORD REPORTS

(*Continued from page 160*)

the best picture by a school child illustrating the "Ten Commandments for a More Beautiful France," for the most beautiful farmhouse, best floral decoration on a building facade and for the most beautifully landscaped side road.

BRONX HOUSING

Gun Hill Houses, a project of the New York City Housing Authority, have been put under construction and will accommodate 733 families upon completion late this year. Architects for the project are Alfred Hopkins & Associates.

The houses, which will cost $6,840,000, are situated on an eight-acre site on one of the highest points in the Bronx. The development will consist of six 14-story apartment buildings housing an estimated population of 2,500.

Like other projects in the Housing Authority's $200,000,000 public housing program, Gun Hill Houses will have a higher standard of design than other low-rent developments. Average rents will be $16 to $18 per room and typical units will be from three to five rooms.

The buildings are being constructed of reinforced concrete and faced with contrasting red brick.

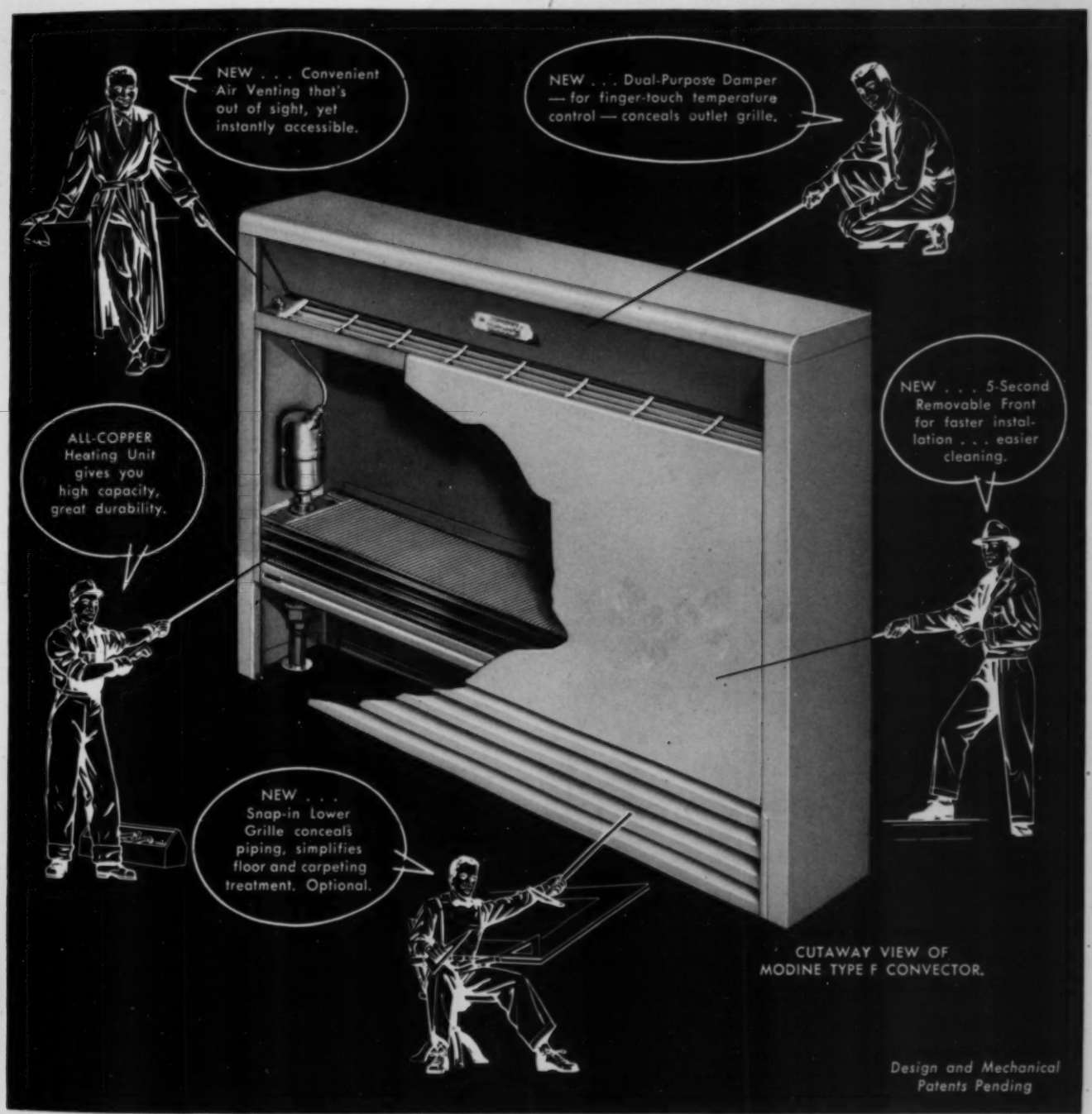
PROJECT GIFT

A gift of $16,500 for the price of a lot and construction costs of a model home has been given to students of the University of Southern California School of Architecture. The money for the home-building project was donated by the California Federal Savings and Loan Association.

The home was designed by four senior architectural students as part of a class project and plans call for 1400 sq. ft. for the building. Livability in combination with functional and economical

(*Continued on page 164*)

Everybody's talking about the Beautiful *Modine* CONVECTOR


NEW . . . Convenient Air Venting that's out of sight, yet instantly accessible.
NEW . . . Dual-Purpose Damper — for finger-touch temperature control — conceals outlet grille.
NEW . . . 5-Second Removable Front for faster installation . . . easier cleaning.
ALL-COPPER Heating Unit gives you high capacity, great durability.
NEW . . . Snap-in Lower Grille conceals piping, simplifies floor and carpeting treatment. Optional.
CUTAWAY VIEW OF MODINE TYPE F CONVECTOR.
Design and Mechanical Patents Pending

BIGGEST NEWS IN CONVECTOR RADIATION HISTORY!

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factors were the keynote of the design. The students studied costs and materials before making final plans and will visit the project frequently to study steps of the construction.

When completed the home will be put on exhibit and will be visited by the public and by students in landscape design. Profits from the sale of the house will be turned over to the School of Architecture for a research fund.

Details of the home include a combination den and guest room, living room with beamed ceilings and a series of rooms fronting on colorful gardens.

ENGINEERS AWARD

John P. Riley, Director of Development for the New York City Housing Authority, has been presented with the first annual award of the New York Association of Consulting Engineers at a ceremony attended by city officials, housing officials and leading engineers at the Architectural League.

TWO-HOUR HOUSE

A house called the "Terrapin" by its designer, a New Zealand engineer, has been developed, which is particularly adapted to the housing of migratory workers and other temporary uses.

Recently demonstrated near London, England, the house was erected in two hours' time and contained a living room, two bedrooms, kitchen and a bath.

Erection involves lifting the house from a truck onto metal piers, opening the sides out on hinges, letting down the floors onto metal supports, rolling the roofs out of slots in the main roof and screwing in the bolts.

HOUSTON EXPOSITION

A record exhibition and entertainment program have been scheduled by the Houston Construction Industries Exposition for its second annual presentation, Sept. 25–Oct. 2. Special features of this year's exhibit will be the expansion of the Apprentice Training Program, displays of "on the job" working methods by all 10 of the building crafts and three miniature homes designed by Architect Wyatt Hedrick.

ATOMIC AGE DESIGN

Arthur Emerson Burton, instructor at Iowa State College Department of Architecture and associate engineer of the U. S. Atomic Energy Commission, has received a $1500 Langley Scholarship from the A.I.A. for research on atomic age architecture, it has been announced by Edmund R. Purves, executive director of the A.I.A.

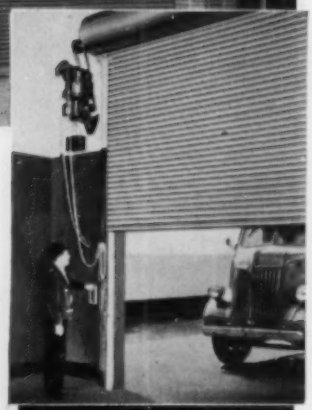
Mr. Burton will carry on research during the academic year on the problems involved in design of laboratory buildings and equipment devoted to atomic energy studies. He will make reports on his findings, the first of which is scheduled to be a complete bibliography of published data on laboratories, both domestic and foreign, since 1939. The second report will be a glossary of definitive terms which must be used by architects in interpreting information about special laboratory design. The third will be a general summary of information obtained from Mr. Burton's scheduled visits to about 15 laboratories.

Other reports planned by Mr. Burton include papers on the actual design and construction of such special laboratory arrangements as walk-in hoods, "can-

(*Continued on page 166*)

Reasons Why it Pays to Insist on

KINNEAR ROLLING DOORS



The Interlocking Steel Slat Door *was originated by Kinnear!*

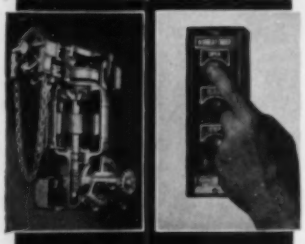
KINNEAR ROLLING DOORS feature the famous interlocking steel-slat curtain that brings highest efficiency to service openings of every type. With smooth, easy coiling upward action, they glide out of the way overhead, safe from damage.

All surrounding wall and floor areas are fully usable at all times. Materials can be stored within an inch or two of the door curtain, on either or both sides, without impeding its action.

The tough, all-steel construction gives Kinnear Rolling Doors longer service life, cuts maintenance costs, assures extra resistance to weather, wear, fire and intrusion.

For added ease and speed of operation, Kinnear Steel Rolling Doors can be equipped with Kinnear Motor Operators. Pushbutton controls may be used at any number of convenient points, if desired.

Kinnear Rolling Doors are built to fit any opening, in old or new construction. Manual, chain, or crank operation available where advantages of motorized doors are not required. Write for the Kinnear Catalog, or for recommendations on specific needs.



The husky Kinnear Motor Operator, controlled by pushbutton, permits you to raise, lower or stop the door from any number of points.

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PITTSBURGH STEEL PRODUCTS COMPANY

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 (Continued from page 164)

yon" design, high and low temperature rooms, special exhaust equipment and new developments in materials.

He will carry out his work in conjunction with research now in progress at Iowa State for the Atomic Energy Commission, and under the general direction of the Institute's Department of Education and Research and the chairman of the Institute's Committee, Prof. Thomas K. Fitz Patrick.

Said Mr. Purves in making the announcement, "The Committee on Planning for the Atomic Age of the A.I.A. is seeking to acquire better knowledge of the technological and defense aspects of architecture and city planning in relation to atomic energy. Mr. Burton will provide us with important new information on laboratory design so necessary in the use of products of nuclear fission for research, medicine and industry."

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The University of Michigan Selected KEWAUNEE Metal Laboratory Equipment for their New Chemistry Building

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COAL STORAGE STUDY

A report on ways to simplify the handling of coal or coke in homes has just been published by the Small Homes Council in a non-technical circular entitled, "Homes Planned for Coal or Coke."

Conducted by Rudard A. Jones, associate professor of architecture at the University of Illinois, the three-year study findings are of interest to architects for suggestions helpful in avoiding fuel bins tucked in unhandy corners of a basement or fuel delivery trucks cutting up lawns.

The suggestions include planning driveways next to the fuel bin; the fuel bin, next to the heater room; the heater room, next to the ash-removal route and the ash-removal route, next to the driveway.

To demonstrate the planning, the circular presents plans of several types of homes and discusses the special problems of each. Sponsors of the three-year study were Bituminous Coal Research, Inc.; the Anthracite Institute and the American Coke and Coal Chemicals Institute.

FRANK R. WALKER

Frank R. Walker, A.I.A., and partner in the firm of Walker & Weeks, died July 9 in Cleveland. He was 61.

Mr. Walker was a graduate of Massachusetts Institute of Technology and studied at the École des Beaux Arts in Paris. Formerly employed in the office of J. Milton Dyer, Mr. Walker formed the partnership with Mr. Weeks in 1911. He was architect for such Cleveland buildings as the main Public Library, the Federal Reserve Bank Building and the Cleveland Post Office. He also designed Wesleyan College in Macon, Ga., and the Indiana War Memorial at Indianapolis.

RAYMOND B. EATON

Raymond B. Eaton, Architect, and member of the Norwalk, Conn., architectural firm of Gilroy and Eaton, died June 21. He was 43.

Mr. Eaton was a graduate of Cornell University and received a degree in architecture in 1929. Before entering partnership in Norwalk he had been associated with the architectural firms of Voorhees, Gamelin and Walker; Felheimer and Wagner; Adolph Mertin and Witschard and Eaton, all of New York.

(Continued on page 168)

Northern Hard Maple Floor of the shipping room, new 238,900-square-foot Montebello (Los Angeles) plant of Helms Bakeries. This shows part of the nearly three acres of MFMA Northern Hard Maple Floor in this "clean-lined" bakery. Ellis Wing Taylor was the architect-engineer, C. L. Peck, the general contractor.

For durable truly resilient, low-maintenance, floors in...

"Our three acres of NORTHERN HARD MAPLE means low maintenance, high morale"

—**E. F. Sperling,** Director of Engineering, Helms Bakeries

SCHOOLS—*As, for instance, this classroom in MFMA Maple, Chicago Vocational School.*

STORES—*Such as Hallowell Seed Co., San Francisco; by Architect Raphael S. Soriano.*

HOMES—*As this one in Bangor, Me.; by Architects Eaton W. Tarbell & Associates.*

When Helms Bakeries executives put their okay on the plans for this new plant, they knew from long experience, how well the vast areas of glistening-clean Northern Hard Maple Floors would serve them. They knew that neither nature nor man has yet produced another floor material so nearly perfect. Merchants, manufacturers, school authorities, home owners, by tens of thousands, know this, too. They esteem Northern Hard Maple for its lifetime endurance, its ever-modern beauty, its cheerful brightness, its permanent ease of cleaning and maintenance and the *resilience* that makes it so pleasant to stand on, walk on, work on, play on. **MFMA** is Northern Hard Maple Flooring at its splendid best—backed by rigid association grading supervision. It's plentiful again. Specify it where your judgment dictates, in fullest confidence of quality, economy and delivery-per-schedule. For catalog data, see Sweet's Arch. 13/g/6—Eng., 4/5/22. Write for latest listing of all the many **MFMA**-approved floor finishing products and processes.

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ON THE CALENDAR

Through Sept. 30: "Details of the City — Photographs by Godfrey Frankel," Museum of the City of New York, New York City.

Aug. 23–26: Pacific General Meeting, American Institute of Electrical Engineers, Fairmont Hotel, San Francisco, Calif.

Sept. 11–17: National Home Week, featuring housing exhibits in cities throughout the country.

Sept. 11–Nov. 20: "For Modern Living," exhibition of contemporary design in home furnishings and objects, Detroit Institute of Arts, Detroit, Mich.

Sept. 11–Oct. 10: 3rd Annual Chicagoland Home and Home Furnishings Festival, Chicago, Ill.

Sept. 19–23: National Technical Conference, Illuminating Engineering Society, French Lick Springs Hotel, French Lick, Ind.

Sept. 25–Oct. 2: Construction Industries Exposition, Sam Houston Coliseum, Houston, Texas.

Sept. 26–29: 51st Annual Convention of the American Hospital Association, Hotel Statler, Cleveland, Ohio.

Sept. 26–Oct. 1: Home Fashion Time, exhibition by the National Retail Furniture Association, Chicago, Ill.

Sept. 30–Oct. 9: Television and Electrical Living Show, Coliseum, Chicago, Ill.

Oct. 10–14: First Pacific Area National Meeting, American Society for Testing Materials, Hotel Fairmont, San Francisco, Calif.

Oct. 17–21: Midwest General Meeting, American Institute of Electrical Engineers, Netherland Plaza Hotel, Cincinnati, Ohio.

Oct. 17–21: 31st National Metal Congress and Exposition, American Society for Metals, Cleveland, Ohio.

Oct. 24–28: 37th National Safety Congress and Exposition, featuring home safety sessions, Morrison Hotel, Chicago, Ill.

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BUILDING NOTES

Binghamton Hospital Addition

Contracts totalling $6,468,562 have been awarded for the construction of a 768-bed Medical-Surgical Building at Binghamton State Hospital. The addition is part of the state's program to relieve overcrowding in its 27 mental institutions. Construction, which will start this summer, will be under the supervision of Cornelius J. White, State Architect, Department of Public Works.

British Prefabrication

Manufacture of a two-story permanent house is planned by the Blackburn Aircraft Company, one of the five British airplane manufacturers who have been carrying out government orders for prefabricated aluminum bungalows. The house, which has a brick shell and prefabricated roof and interior, can be erected in two, four, six or eight dwelling blocks in from six to eight weeks. The cost will be equal to that of a traditional brick house of the same size.

New Knoll Showroom

A Chicago headquarters has been opened by Knoll Associates, Inc., for the display of modern furnishings. The showroom remodeling was conducted under the hand of Florence Knoll, de-

(*Continued on page 170*)

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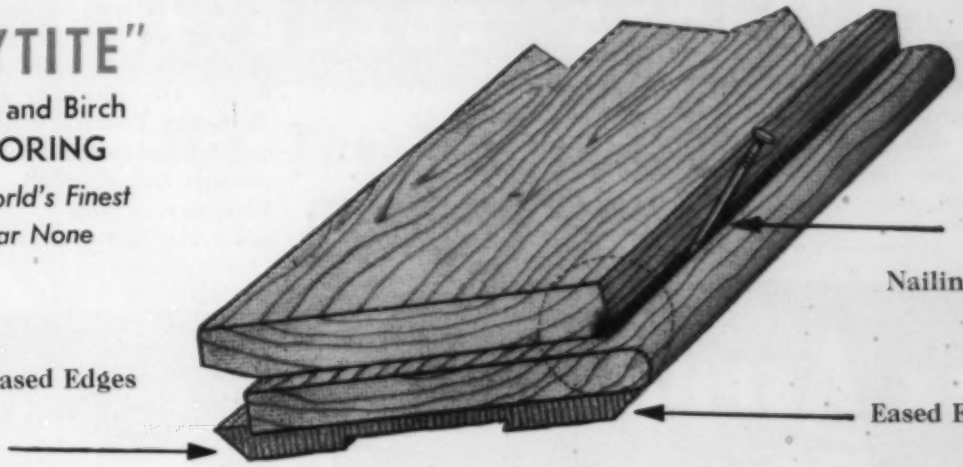

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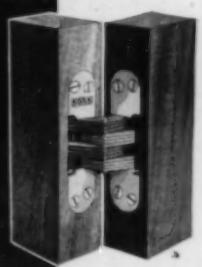

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Lang & Raugland, Minneapolis Architects, by using SOSS INVISIBLE HINGES, succeeded in creating modernistic interior effects in this building that could never have been realized with old style, butt type hinges!

These remarkable SOSS HINGES have NO UGLY, BULKY, PROTRUDING hinge butts to mar the graceful lines of modern design. They're the only hinge that absolutely assures the architect of the soft, smooth, streamlined, harmonious interiors that are so very necessary to really modern architecture. There's a weight-rated SOSS HINGE, operating on hardened steel links and roller bearings, for every type of installation.

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signer of Knoll furniture and textiles, who coordinated the work of the technicians and designers throughout the process.

New G.E. Laboratory

The opening of General Electric's High Voltage Engineering Laboratory was marked recently with a display of artificial lightning of high voltage. The new plant at Pittsfield, Mass., will be used to conduct basic research into lightning and other high-voltage electric discharges and was constructed under the architectural supervision of C. A. Harwick. The building was erected at an approximate cost of more than $2 million, including equipment, and is of steel and concrete construction.

Carbide Research Center

A new organic chemical research center has been put into operation by Carbide and Carbon Chemicals Corp. Located on a 140-acre tract near the company's South Charleston, W. Va., plant, the laboratory project was designed by Harry L. Porter, Architect. The plant consists of a main laboratory building, now in use, and four development buildings to be opened in the near future. The laboratory building is a three-story T-shaped structure of brick and steel and contains 69 individual laboratories and 48 offices, a large-scale laboratory, a library, an auditorium and storage and service rooms.

Carbide & Carbon Chemicals Corp. Photo

AT THE COLLEGES

Finnish Students

Students at the Finland Institute of Technology are engaged in a vast extra-curricular project: the erection of a Students' Town consisting of dormitories for 2100 students, infirmaries, athletic grounds and administration buildings to replace and expand the old quarters of the Institute. Students are engaged in all kinds of money-raising projects and are doing the building of this academic center with their own hands. At present they are in hopes of completing three dormitories with accommodations for 500 students by the time of the Olympic Games in 1952.

Award Winners

Miss Jean Woodham, of New York City, has been awarded the 18th annual Kate Neal Kinley Memorial Fellowship of $1000 given by the University of Illinois. Miss Woodham is a graduate of the Alabama Polytechnic Institute School of Architecture and The Arts.

Three students of architecture at Cooper Union Art School have been awarded prizes of $100 each for their outstanding work. They are Barnett B. Berliner, Vincent M. Milone and Andrew Mitropoulos.

(*Continued on page 172*)

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- MORE RESILIENCY — and AZPHLEX has it!
- GREATER COLOR VARIETY — and AZPHLEX has it!
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AZPHLEX offers maximum resistance to the effects of animal, mineral and vegetable greases, alkalis, alcohol and mild acid solutions. It will not soften or discolor in contact with these usually harmful agents. Its resistance to indentation from rolling or standing loads is equally high, and it is immune to the scuffing and scarring associated with daily traffic.

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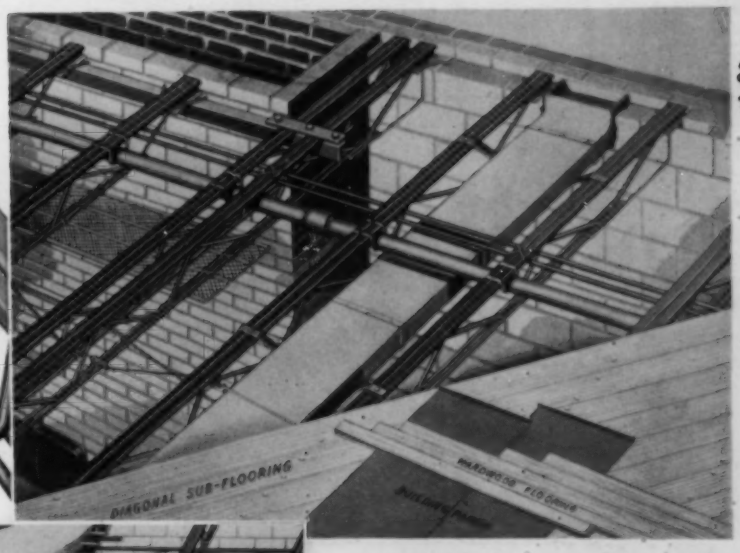

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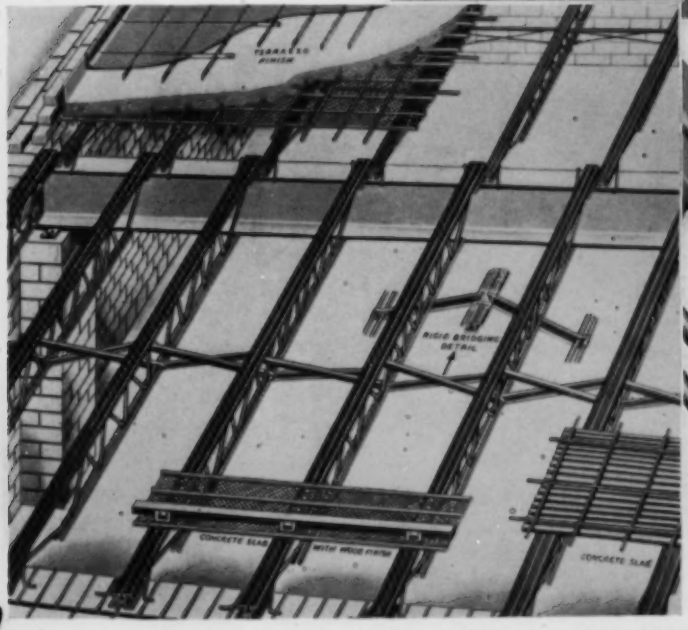

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THE RECORD REPORTS (*Continued from page 170*)

Joseph Hudnut, Dean of the Graduate School of Design at Harvard University, received the degree of Doctor of Fine Arts at the commencement exercises of the University of Michigan. The citation read in part, "In making architecture responsive to modern needs and in . . . expressive designs, he has created new forms of enduring beauty."

Dr. Robert L. Wolff, associate professor of history at the University of Wisconsin, and G. E. Kidder Smith, critic in architectural design at Yale University, have been named President's Fellows by Brown University.

Charles W. Moore, of San Francisco, Calif., has been named winner of the George G. Booth Travelling Fellowship Competition for 1949 at the University of Michigan.

John B. Lippard, of Raleigh, N. C., has won the $100 prize offered by the Department of Landscape Architecture at the North Carolina State College for his landscape design of a plant nursery display area.

Dr. Henry T. Heald, president of Illinois Institute of Technology, has been awarded an honorary associate membership in the Chicago Chapter, A.I.A.

New Construction

Work has begun on the new Institute of Gas Technology building for Illinois Institute of Technology. The new structure will be in the modern functional design chosen for the recently completed laboratory and classroom buildings on the campus. Designer of the new building is Ludwig Mies van der Rohe, head of the Institute's Department of Architecture.

Faculty Appointments

Dr. J. C. Warner, Dean of Graduate Studies and Head of the Chemistry Department at Carnegie Institute of Technology, has been named President-Elect to succeed Dr. Robert E. Doherty, who will retire as Carnegie's president next year.

J. Donald Mochon, assistant professor of architecture at Rensselaer Polytechnic Institute since 1946, has been promoted to the position of associate professor.

Dean Henry L. Kamphoefner of the North Carolina State College School of Design has been appointed to membership on the national committee on education of the A.I.A.

John W. Hargrave, Architect, has been appointed director of the University of Cincinnati Alumni Association for the 1949–50 period.

John Knox Shear has been appointed Head of the Carnegie Institute of Technology Department of Architecture. A 1938 graduate of the Institute, Mr. Shear has been Assistant Head of the department for the past two years. He is an associate professor.

OFFICE NOTES

Offices Opened, Reopened

Charles N. Bayless, A.I.A., has opened an office for the general practice of architecture at 108 Walnut St., Lexington, Ky.

Frederick C. Klawiter, Architect, has opened his own office at 2077 Fairmount Ave., Saint Paul 5, Minn.

Lloyd J. Fletcher, A.I.A., has announced the opening of an office at 212 W. Main St., Visalia, Calif.

(*Continued on page 174*)

You'll never know exactly what a roof costs until it's worn out, or until its service fails. Then it may prove terribly expensive . . . or it may prove to have been an excellent investment.

Investment . . . that's the word for a roof of Bird Master-Bilt® Shingles . . . the kind of strong, lasting investment your clients and customers expect you to make for them. Master-Bilts add rich beauty and texture . . . they're available in many colors and blendes, in more variety than any other roofing material. Bird's experience since 1795 is reflected in the narrow cut-outs, the heavy shadowlines, and the massive Bird thick-butt construction (extra layers of asphalt and mineral granules where it counts . . . on exposed tabs). Bird processes *every* material . . . another reason for the unparalleled quality of these shingles.

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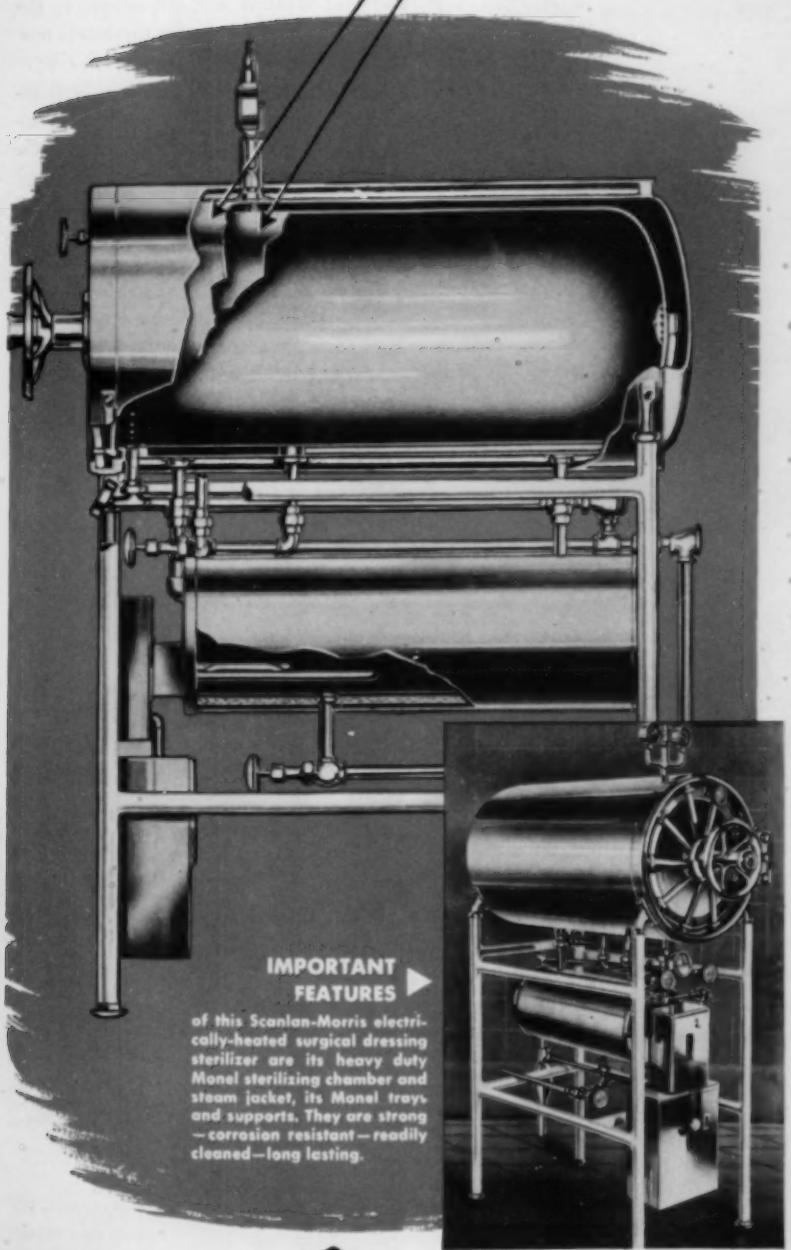
Bring your clients 5 Extra Benefits



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● Look carefully at the phantom view of this Scanlan-Morris sterilizer.

See the inner cylinder that forms the sterilizing chamber?

That's Monel*. And so is the second cylinder that fits over it, forming the space that makes the steam jacket.

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When it comes to cleaning, hospitals find that plain soap and water are usually enough to keep Monel's smooth surfaces bright and sanitary. But even detergents and abrasive cleansers won't hurt Monel. It's a metal that never needs to be pampered. It's *solid*—there's nothing to chip, nothing to peel off or wear away.

Summed up, these are the extras clients get when "Monel construction" is specified for Scanlan-Morris sterilizers: 1) A strong, *solid* metal that is 2) immune to rust and 3) resistant to staining and corrosion, yet 4) can be readily cleaned throughout 5) a long, trouble-free life!

Monel construction is now available in Scanlan-Morris cylindrical pressure-type surgical supply sterilizers, instrument sterilizers, solution sterilizers and water sterilizers. It is *standard construction material* in all Scanlan-Morris non-pressure boiling-type instrument and utensil sterilizers.

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Firm Changes

Commercial Testing and Engineering Company has announced a change in the name of its engineering department to Carroll, Bechtel and Langtry, Power Plant Consulting Engineers, with offices at 307 N. Michigan Ave., Chicago 1, Ill.

New Addresses

The following new addresses have been announced:

W. Pope Barney and Roy W. Banwell, Architects, 2408 Girard Trust Company Bldg., Philadelphia 2, Pa.

Robert D. Dalton, Consulting Structural Engineer, 374 17th St., Oakland 12, Calif.

C. Dale Dykema, Architect, 14966 Gulf Blvd., Madeira Beach, Fla.

Henry George Greene, A.I.A., 855 Avenue of the Americas, New York 1, N. Y.

Radey and MacNelly, Architects and Engineers, S.W. cor. 8th and Market Sts., Camden, N. J.

Harry Hayden Whiteley, A.I.A., 4205 Pacific Highway, San Diego 10, Calif.

ELECTIONS, APPOINTMENTS

Roger and Louis Corbetta have been elected vice presidents of the Ibec Housing Corporation, in charge of the construction division. Newly appointed Consulting Engineer of the firm is Emil H. Praeger, partner in the firm of Madigan and Hyland and consultant to the United Nations on its headquarters now under construction in New York City.

J. Clydesdale Cushman has been reelected president of the National Association of Building Owners and Managers. Also reelected to office were James F. Cook, Jr., first vice president, and Charles M. Underhill, secretary-treasurer.

James F. Fairman, vice president of Consolidated Edison Company of New York, Inc., has been elected president of the American Institute of Electrical Engineers for the year beginning August 1.

Charles H. Goddard, of Sylvania Electric Products, Inc., has been elected president of the Illuminating Engineering Society.

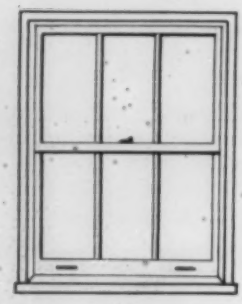
Walther H. Kilham, Jr., has been elected president of the New York Chapter, A.I.A. He succeeds Harold R. Sleeper who served two terms of office as president. Also elected to office were Ben John Small, vice president; M. Milton Glass, secretary and William Potter, treasurer. Members of the executive committee elected were: Harry M. Prince and Harold R. Sleeper to 1950; Daniel Schwartzman to 1951 and Morris Ketchum, Jr., and Robert A. Jacobs to 1952.

J. G. Morrow, Metallurgical Engineer, of Hamilton, Ont., has been elected president of the American Society for Testing Materials.

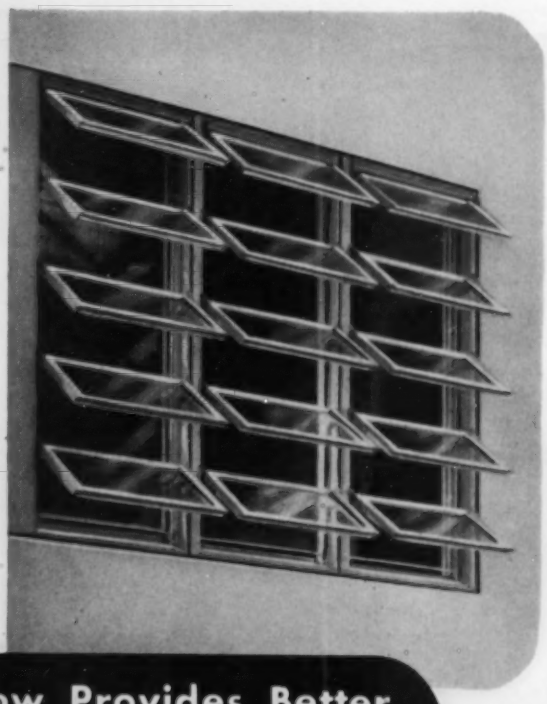
Ralph Evans, of the architectural firm of Chapman, Evans & Delehanty, has been appointed one of five new directors of the board of Intra-Video, Inc.

ADDENDUM

In the July issue of the RECORD, the date of the course in lumber and retailing, offered by the City College of New York, should have been July 11. The incorrect date published was contained in the announcement supplied to the RECORD.



ABOVE: Maximum ventilating area, 50%. Difficult to open and close. Mechanical ventilation necessary for uniform results.



RIGHT: 100% ventilating area. Natural no-draft ventilation. Easily operated by turning handle on worm-and-gear mechanism.

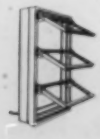
Which Window Provides Better Ventilation... Greater Economy?

Before you approve conventional windows . . . before you specify expensive ventilating equipment,—investigate Gate City Awning Windows. Their adjustable open-out sash scoop air in on calm days, control it on breezy days.

Air currents flow ceilingward, "scouring out" hot, stagnant air, keeping lower air fresh. Even stormy weather ventilation is practical, thanks to the rain-deflecting sash.

Precision-built at the factory for greatest economy, Gate City Awning Windows are furnished complete (with glass and hardware in place) for simplest, most economical handling and installation. Special glass may be specified to eliminate glare and heat while providing adequate light and ventilation.

Write today for full information. Please address Dept. AR-8. Our catalog is also in Sweet's.

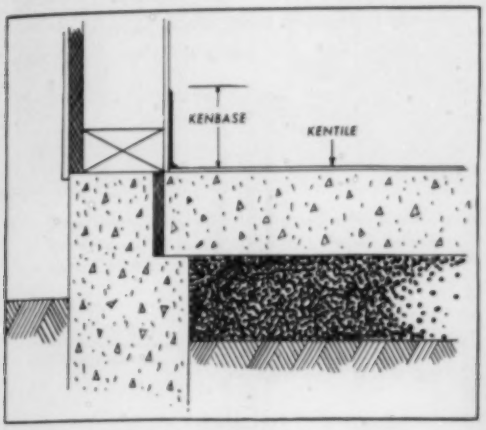


AWNING WINDOWS BY

Gate City

Offices and Factory: Fort Lauderdale, Florida • Export Sales Representative: Frazar & Company, 50 Church Street, New York 7, U.S.A. • Cable Address: Frazar, N. Y. • Agents in principal cities throughout the world.

KENTILE GIVES NON-BASEMENT HOMES HANDSOME, LONG-LASTING FLOORS



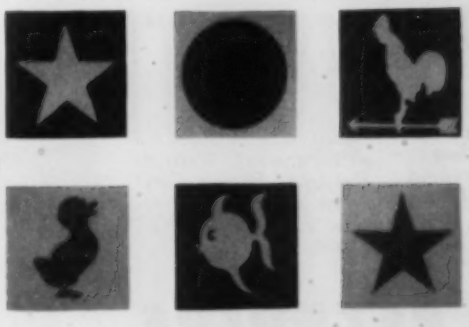
Installs on concrete in direct contact with the earth—All fillers, binders and pigments in Kentile have high resistance to the alkali found in concrete. And Kentile's asbestos filler assures insulation against the cold and moisture in concrete floors. Equally ideal for installation on radiant-heated concrete slabs.

Also: Kentile can be laid over double T & G wood floors —or directly over firm plywood. Saves installation and labor costs because it can be laid tile by tile—eliminating the handling problems in laying flooring from heavy, hard-to-move rolls. Ready for use as soon as it is laid.

A CHILD'S BEDROOM like this gets hard usage—but that won't faze Kentile. Colors go clear through the tough, scuff-resisting material—can't wear off. Kentile stoutly resists dirt and stains—a few flicks of the mop and it's shining like new. The many desirable features of these attractive resilient floors are being brought to your clients' attention in leading magazines.

EVERY ROOM in the 6,000 Levitt Homes is floored with Kentile. Because it permits installation right over concrete on grade, Kentile helps cut construction costs in homes like this.

KENTILE floors give you freedom for design at low cost.



IN ADDITION TO 23 COLORS and a wide variety of feature strips, you can select "Kenserts" and "Themetile"—individual decorative touches for adding custom-made distinctiveness at low cost.

KENTILE®

The Permanently Beautiful Asphalt Tile

DAVID E. KENNEDY, INC. 58 Second Avenue, Brooklyn 15, N. Y. • 1211 NBC Bldg., Cleveland 14, Ohio • Bona Allen Bldg., Atlanta 3, Ga. • 452 Statler Bldg., Boston 16, Mass. • 705 Architects Bldg., 17th and Sansom Street, Philadelphia, Pa. • 4532 So. Kolin Avenue, Chicago 32, Ill. • 350 Fifth Avenue, New York 1, N. Y. • 1440 11th Street, Denver 4, Colo. • 2201 Grand Avenue, Kansas City 8, Mo. • 1855 Industrial Street, Los Angeles 21, Calif.

(*Continued from page 147*)

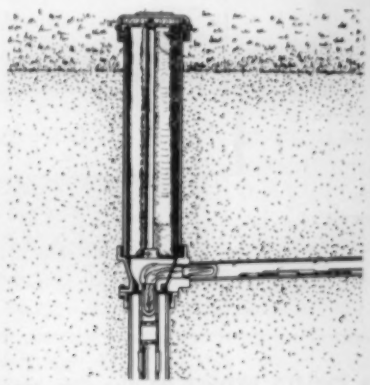
PITLESS PUMP ADAPTER

Immediate access to the well and all parts therein without construction of the conventional concrete pit is said to be provided by a new pitless adapter for "off-set" installation of jet or shallow-well pumps.

Designed to eliminate cost and sanitation objections to the conventional pit installation or its usual alternative, the pump house, the *Williams* pitless adapter can be installed quickly and easily, according to the manufacturer.

The trench is dug from the well to the basement, utility room or garage where the pump is located and the well casing is cut off below the frostline. The adapter is then put in place. Jet, footvalve and drop pipes are removed from the well by removing the aluminum cover cap and lifting by means of a lifting pipe. No digging is required and no special tools are needed.

Objections to the conventional concrete pit by health authorities derive from the fact that it must be provided with a positive drain, which is considered a potential avenue of contamination for the well. The pump house which is the usual alternative presents the problems of heating in cold weather, of deterioration due to condensation in warm weather, and of finding a site on the building lot for such a structure.



Well installations are serviced easily by removing cover of this pump adapter

Adapters are made with interchangeable base flanges for 4-, 4½-, 5- or 6-in. wells and in two lengths to meet the local requirements for frost protection. Williams Products Co., P. O. Box 1181, 700 Railroad St., Joliet, Ill.

"FLOATING" TILE ROOF IS SOLUTION FOR EXPANSION

A quarry tile floor for a roof deck constructed without expansion joints is reported by the Tile Council of America to have undergone four years of use without signs of deterioration.

Design of the floor for the roof deck of the Army-Navy Country Club at Arlington, Va., so that it "floats" on the roof enabled Architect George A. Daidy of Washington, D. C., to evade the problem of expansion joint material

Quarry tile floor for Army-Navy Club deck

(*Continued on page 178*)

Remember this dependable source of supply

REYNOLDS
ARCHITECTURAL
SHAPES
Add Enduring Beauty

WAREHOUSED IN YOUR AREA FOR PROMPT DELIVERY

● Attractive, enduring architectural shapes made of Reynolds *Lifetime* Aluminum—more than 65 standard items, most of which are warehoused by a distributor near you.

Remember aluminum for lasting beauty and economy. And remember, too, Reynolds is prepared to quote you on aluminum architectural shapes, whether standard or special, for such applications:

INTERIOR

Thresholds	Decorative Trim
Doors and Jambs	Showcase Mouldings
Bases	Escalator Balustrading
Railings	Elevator Doors, Cabs
Pilasters	Terrazzo Strips

EXTERIOR

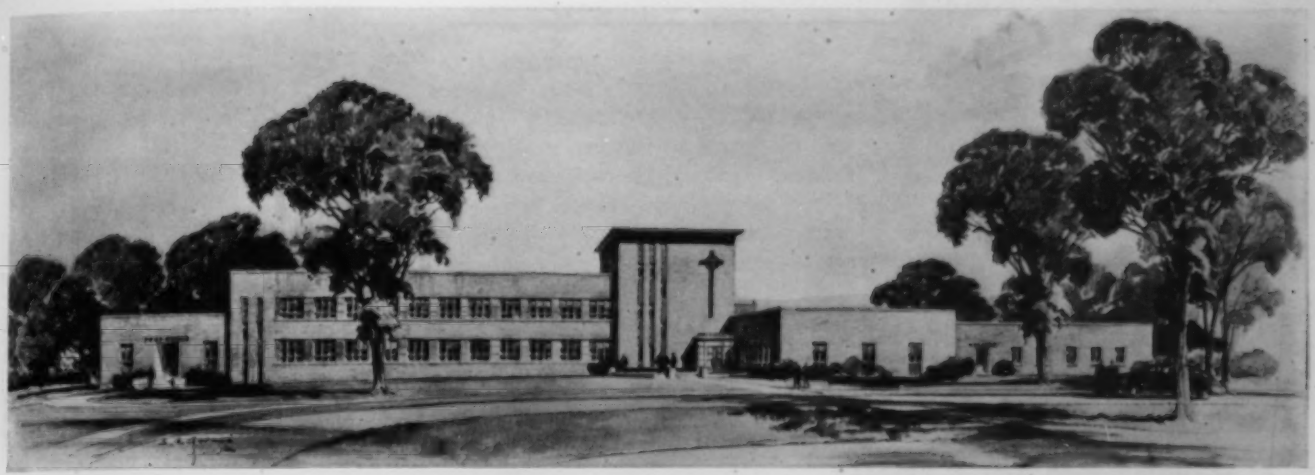
Doors and Jambs	Windows and Sills
Thresholds	Marquees
Transoms	Tablets, Signs
Store Fronts	Sign Letters
Spandrels	Awnings
Copings	Facings

Call nearest Reynolds Office, listed under "Aluminum" in your classified telephone directory, or write to the address below.

FREE FOLIO! *Engineering drawings of all standard shapes in one compact folder. Can be used for direct tracing. Write to Reynolds Metals Company, Aluminum Division, 2572 South Third Street, Louisville 1, Ky.*

REYNOLDS
Lifetime ALUMINUM

THE COMPLETE ALUMINUM SERVICE
FROM MINE TO FINISHED PARTS



Boys Town, Nebraska, equipped with 2,621 Fencraft Windows in the Administration Building (above), High School, Trade School, Reception Hall, Dining Hall and Cottages. *Architect:* Leo A. Daly Co., Omaha. *Contractor:* Peter Kiewit Sons Co., Omaha.

Your first trip to Boys Town, Sir?

Come in, won't you, and look around.

A famous and beautiful place, Boys Town. The warm, friendly feeling of gracious living you see in the rooms at your right means a lot to the boys who live here . . . a lot to the men who teach here.

At least a part of that feeling comes through the windows . . . Fenestra's* Fencraft Intermediate Steel Windows. Daylight and controlled fresh air are literally built into each room.

If you'd like to have the same qualities in your own buildings, here are some simple facts you'll want to know:

Fenestra's volume of production allows standardization of a *large variety* of windows—quality is high, cost stays low.

Beautiful Fencraft Windows are made of casement sections of advanced design—fabricated into three popular and efficient types—Projected, Casement and Combination—in a wide range of sizes.

All 3 types offer permanently-easy operation in any weather . . . weather-tightness . . . firesafety . . . low maintenance (they're Bonderized) . . . cleaning and screening from *inside*.

For full information on types and sizes, please mail the coupon, or see Sweet's section 16a/13. *®

The Dining Hall sunlit by dozens of Fenestra Casement Windows.

An office brightened by a bay of Fencraft Combination Windows.

A cottage made light and gracious by graceful Fenestra Casement Windows.

Fenestra

FENCRAFT INTERMEDIATE STEEL WINDOWS

Detroit Steel Products Company,
Dept. AR-8,
2252 East Grand Blvd.,
Detroit 11, Michigan

Please send me data on types and sizes of the new Fencraft family of Fenestra Windows.

Name_____

Company_____

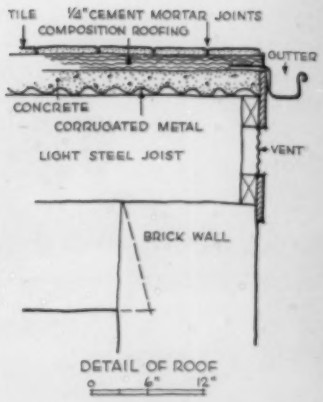
Address_____

(Continued from page 176)

which gets tracked into other parts of the building and in summer heat softens and becomes sticky, so that the roof cannot be used for dancing and other recreation.

The fact that the roof, which is 52 ft. by 112, adjoins masonry on only one side was the key to Mr. Daidy's solution. The roof slab is anchored to this masonry, and the other three sides protrude over the walls and thus are free to expand in summer weather. A balustrade encloses the roof, where there is no parapet. This means that the whole slab beneath the tile can come and go with changes in the weather and will not crack, since no compressive strain is set up.

The roof slab rides on a strong grid of light steel joints, over which corrugated metal was laid and a bed of concrete then poured. The quarry tile was set in elastic composition roofing, but tiles were grouted with conventional cement mortar, which seals in tar and asphalt substances in the roofing so that no sticky substances can come through to damage shoes or clothing.



Roof rides on grid of light steel joints

The quarries are 6-in. squares and the grout ¼ in. Tile Council of America, 10 E. 40th St., New York 16, N. Y.

WARM AIR RADIANT HEATING

A system of warm air radiant heating which permits use of a steam boiler and steam coil to heat the air can be adapted for old or new houses, one- or two-story, with or without basements.

For a two-story house with basement, the system in its simplest form employs a steam boiler with a steam heat exchanger coil directly above it attached to the basement joists.

Heated air rises through a vertical heat shaft to the drop ceiling of the first floor, where it spreads out for distribution in all directions.

Vertical stud spaces in the outside walls are used as return air ducts, reportedly insuring automatic reaction to temperature changes at all points.

In a one-story house with basement, the heated air is applied under the floor and the basement is heated from its ceiling and the first floor rooms from the floor.

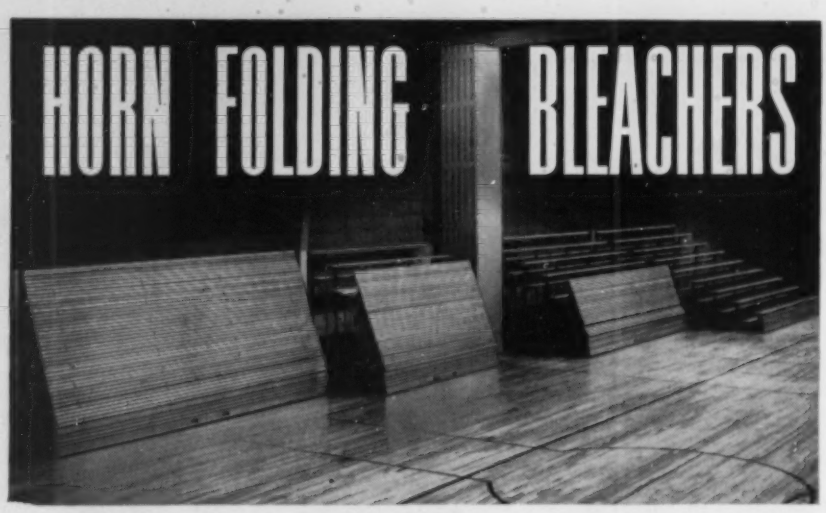
With the boiler located in a utility room and the steam coil and blower in the attic space, a one-story house without basement is heated from the ceiling in the same manner as a two-story house.

A hot water boiler may also be used, and the system is available with gas burner, oil burner or stoker. Scott-Newcomb, Inc., 1442 S. Boyle Ave., St. Louis, Mo.

HIGH FIRE RATING FOR VERMICULITE PLASTER

Official fire ratings of 4 and 3 hours for steel columns protected with 1½ in.

(Continued on page 180)



Horn Folding Bleachers and Horn Folding Partitions for Greater Space Utilization

CHECK YOUR SPACE REQUIREMENTS

ROWS	FLOOR SPACE IN USE	FLOOR SPACE *CLOSED	**HEIGHT
3	4 Ft. 9 In.	1 Ft. 8¾ In.	3 Ft. 0 In.
4	6 Ft. 7 In.	2 Ft. 0⅛ In.	3 Ft. 9 In.
5	8 Ft. 5 In.	2 Ft. 3½ In.	4 Ft. 6 In.
6	10 Ft. 3 In.	2 Ft. 6⅞ In.	5 Ft. 3 In.
7	12 Ft. 1 In.	2 Ft. 10¼ In.	6 Ft. 0 In.
8	13 Ft. 11 In.	3 Ft. 1⅝ In.	6 Ft. 9 In.
9	15 Ft. 9 In.	3 Ft. 5 In.	7 Ft. 6 in.
10	17 Ft. 7 In.	3 Ft. 8⅜ In.	8 Ft. 3 In.
11	19 Ft. 5 In.	3 Ft. 11¾ In.	9 Ft. 0 In.
12	21 Ft. 3 In.	4 Ft. 3⅛ In.	9 Ft. 9 In.
13	23 Ft. 1 In.	4 Ft. 6½ In.	10 Ft. 6 In.
14	24 Ft. 11 In.	4 Ft. 9⅞ In.	11 Ft. 3 In.
15	26 Ft. 9 In.	5 Ft. 1¼ In.	12 Ft. 0 In.
16	28 Ft. 7 In.	5 Ft. 4⅝ In.	12 Ft. 9 In.
17	30 Ft. 5 In.	5 Ft. 8 In.	13 Ft. 6 In.
18	32 Ft. 3 In.	5 Ft. 11⅜ In.	14 Ft. 3 In.
19	34 Ft. 1 In.	6 Ft. 2¾ In.	15 Ft. 0 In.
20	35 Ft. 11 In.	6 Ft. 6⅛ In.	15 Ft. 9 In.

*Dimension includes 4½ in. space between top seat and wall.
**Height in open position same as closed. For Bleachers higher than 20 Rows write for complete details and dimensions.

FOR SEATING CAPACITY FIGURE 16" PER PERSON. WRITE FOR COMPLETE DETAILS ON THE "3 IN 1 HORN GYM PLAN". NO OBLIGATION.

HORN BROTHERS CO.
A DIVISION OF HORN INDUSTRIES
FORT DODGE, IOWA — ESTABLISHED 1909

10 more reasons— why customers are saying "make *mine* Marlite!"

Remarkable is the word for these exciting new Marlite plastic-finished wall panels. Here's all the rich warmth of fine woods, the stately grandeur of rare, imported marbles . . . faithfully reproduced and permanently retained in Marlite's exclusive *sealed-in* surface. And matching mouldings, in wood and marble patterns, complete the effect.

Think of the distinctive new interiors you can offer your clients with these authentic patterns—in offices, stores, banks, hotels, institutions, homes, and a host of other interesting installations. And builders will tell you that famous Marlite is easy to work and handle . . . goes up fast over old walls or new . . . covers wide areas quickly and at surprisingly low cost. Marlite is perfect for either new construction *or* remodeling. Marsh Wall Products, Inc., Subsidiary of Masonite Corp.

Marlite
PLASTIC-FINISHED
WALL PANELS

Mahogany Wood Pattern Marlite used in the new offices of the Calumet Brewery, East Chicago, Ind.

Ideas for Architects!

Marsh Wall Products, Inc. Dept. 805 Dover, Ohio

☐ Please send my FREE copy of your new 4-color idea stimulating folder on the 10 new Marlite Wood and Marble-Patterns.
☐ I can also use other descriptive literature on the complete Marlite line.

NAME_____

FIRM_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

(*Continued from page 178*)

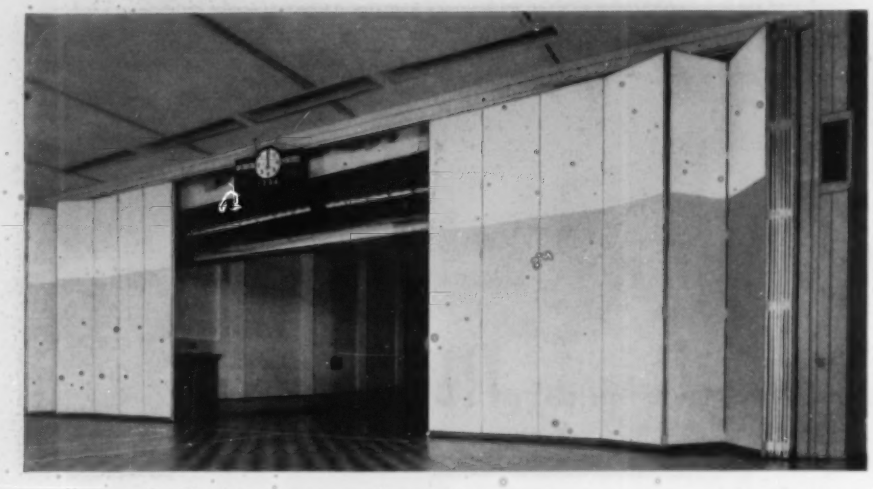
and 1 in. respectively of *Vermiculite* plaster on metal lath have been issued by Underwriters' Laboratories.

Proportions, in keeping with American Standards Association standard specifications for gypsum plaster, for the scratch coat were 100 lb. of fibered gypsum plaster to 2 cu. ft. of Vermiculite plaster aggregate; for the brown coat, 100 lb. of fibered gypsum plaster to 3 cu. ft. of Vermiculite aggregate.

In the recent tests, the Vermiculite plaster was applied to metal lath spaced 1¼ in. away from column flanges. Space between the back face of the metal lath and the column flanges was maintained by use of metal lath spacers, and the space was then filled solid with Vermiculite plaster, pressed through the lath at the time of application. A white coat finish was applied to both columns.

Sponsors of the tests report Vermiculite plaster is the only type which has received a rating as high as 4 hrs. for column protection. Vermiculite Institute, 208 S. La Salle St., Chicago 4, Ill.

SpaceSavers...
FOR SCHOOLS LARGE OR SMALL

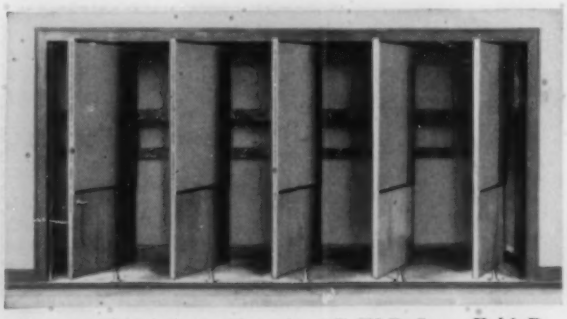


R-W DeLuxe FoldeR-Way Partition ***Automatic—Electric***

Specifically designed for school gymnasiums, auditoriums, stages, and other high or wide openings which must be closed against both light and sound, DeLuxe FoldeR-Way partitions by Richards-Wilcox are completely automatic and cost less than many manually operated partitions. To economize in space and expenditures, consider R-W DeLuxe FoldeR-Way partitions in your building or remodeling plans.

R-W No. 883 Multiple Action School Wardrobe

An outstanding feature of Richards-Wilcox Classroom Wardrobes is that the entire unit is designed to avoid overcrowding. The hat and coat racks accommodate eight or ten pupils for each door. Note slate blackboards mounted on wood doors.



For complete information about R-W DeLuxe FoldeR-Way Partitions and Multiple Action School Wardrobes, contact our nearest office.

Richards-Wilcox Mfg. Co.
"A HANGER FOR ANY DOOR THAT SLIDES"
AURORA, ILLINOIS, U.S.A.
Branches: New York Chicago Boston Philadelphia Cleveland Cincinnati Washington, D.C. Indianapolis St. Louis New Orleans Des Moines Minneapolis Kansas City Los Angeles San Francisco Denver Seattle Detroit Atlanta Pittsburgh

1880 RICHARDS WILCOX R&W AURORA 1949
OVER 69 YEARS

LIBRARY FURNITURE

Sectionalized construction permitting sectional or unit assembly is a leading feature of *New Life* library furniture, which is characterized by flat planes, smooth surfaces and natural grain finishes.

Made in a variety of selected woods which include birch, maple and oak, New Life designs are available in charging desks with color-selected linoleum tops; library shelving to create newspaper racks, magazine racks and glazed door cabinets; filing cabinets; dictionary stands; round or rectangular tables.

Flexibility of arrangement as well as choice of unit type are said to be important advantages offered by the line. John E. Sjostrom Co., 1715 N. 10th St., Philadelphia 22, Pa.

PUSH BUTTON DOOR "KNOB"

A door "knob" that's not made for turning is the new *Tenite* plastic handle, made to be screwed to the door at top and bottom, and containing a push button and a standard-size keyhole.

Set flush in the center of the handle, and made in a contrasting color, the button is aligned with the latch case so that, when pressed, it releases the latch bolts, and the door can be opened. Closing the door re-cocks the latch.

A set of handles and corresponding

Pressing of button releases latch bolts

latch and catch plate can be installed either in a new door or in the recess of an old lock. Canadian Automatic Latch Co. Ltd., 103 Woodycrest Ave., Toronto, Canada.

(*Continued on page 182*)

pick and shovel days are over

for stainless sheet and strip

Bull-dozers and steam shovels ended pick and shovel methods in earth moving. So modern strip mill facilities banished pick and shovel techniques in rolling stainless sheet and strip. Climaxing this progress, CRUCIBLE, a *specialty steel* producer for half a century, has built an $18,000,000 mill at Midland Works *specifically* for rolling stainless steel—the *first mill* that has ever been built to take complete advantage of the *best* in stainless rolling practice.

You would expect this of CRUCIBLE. You would expect that the top organization in the *specialty product* field would make stainless as a specialty—and you would be right. Here at Midland, hot and cold rolled stainless sheet and strip are made in widths from ½″ to 50″ inclusive, in all gauges, grades and finishes, with the same precise quality control that has made CRUCIBLE the leader in special service steels for generations.

Moreover, with Trent Tube Co. joining the organization you can now turn to CRUCIBLE for *every* type of stainless—sheets, plates, strip, bars, tubing, forgings, wire and castings. Data sheets are available for all grades. Your inquiries will have prompt attention.

CRUCIBLE STEEL COMPANY OF AMERICA
405 Lexington Ave., New York 17, N.Y.
Branches, Warehouses and Distributors in Principal Cities

CRUCIBLE first name in special purpose steels

hot and cold rolled **STAINLESS SHEET AND STRIP**

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS

(*Continued from page 180*)

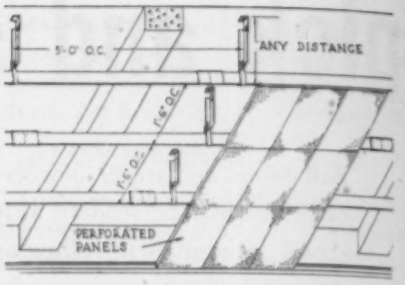
GYMNASIUM CEILING

An aluminum panel acoustical ceiling specifically designed for gymnasium adaptation is said also to provide for uniform air distribution, since the holes in each panel can be utilized as air delivery orifices.

Described as entirely incombustible, the panels, which are 1 ft. wide and 1½ ft. long, can be removed for access to plumbing, wiring or ductwork above.

Costs are said to be lowered by use of a simplified suspension system to eliminate the standard cross furring procedure for hung ceiling work.

The manufacturer reports that a 75 per cent noise reduction coefficient can be obtained by covering two thirds of the ceiling area above the aluminum panels with sound absorbing pads. Simplex Ceiling Corp., 552 W. 52nd St., New York 19, N. Y.



Aluminum panels for gymnasium ceiling

PHOSPHORESCENT SIGNS

A new series of "Exit" and "Fire Escape" signs utilizes phosphorescence to keep the signs glowing after other light sources are gone.

The signs are designed for installation without separate service if desired. In many localities, they may be wired to present system.

The series carries the U. L. Approved

Exit sign "glows" when power goes off

label. All American Products, Dept. 175, 141 Jackson Blvd., Chicago, Ill.

INNER-SERVICE THEATER SIGN

Designed to retain the advantages of the inner-service marquee while conforming to economy and space specifications less generous than average is the new attraction sign erected at the Strand Theater in Milwaukee, Wis.

Like the inner-service marquee first installed at the Fox Garfield Theater

(*Continued on page 184*)

Attraction board is serviced from inside

One of several Barcol OVERdoors at loading platform openings. These doors are exposed to the weather, must close tight to keep stored cookies fresh and the boxes clean.

ARCHITECTS
AULER, IRION & WERTSCH
OSHKOSH • WISCONSIN

Left, a big Barcol OVERdoor on the main truck entrance into the plant. This door is electrically operated, opening and closing smoothly and quickly by convenient switch control.

A MODERN FOOD PLANT USES

BARCOL OVERdoors

ELECTRIC DOOR OPERATOR
Specially designed, with distinctive features. Adaptable to all types of sliding, steel rolling, and overhead doors, also to sliding gates.
Write for up-to-date literature.

Wisconsin is one of our States where good food is enthusiastically produced . . . and consumed. Only natural, then, that in building the Rippin' Good Cookies new plant, up-to-date design and quality equipment were used throughout . . . including Barcol OVERdoors on the service entrances. The Barcol OVERdoor is ideal for buildings where lasting performance is important. It is sturdily built of best materials, carefully engineered for strength, durability, and smooth operation, and accurately installed and serviced by factory-trained men. The Barcol OVERdoor excels in being weathertight AND easy-working. For details of possible applications, consult your Barber-Colman representative. *See Our Catalog in Sweets'.*

FACTORY-TRAINED SALES and SERVICE REPRESENTATIVES in PRINCIPAL CITIES

BARCOL
BARBER-COLMAN COMPANY
102 MILL ST. • ROCKFORD, ILLINOIS

MAKE YOUR CLIENTS HAPPY...

DESIGN A ROOM LIKE THIS

... Just for Fun!

Put a plaid pattern of Mura-Tex* on the wall. Design a shuffleboard into the Flexachrome* floor. Make a table from a lolly column. Presto! you've designed a playroom a millionaire would be proud to own...and one almost every client can afford.

Point out how easy it is to transform the dreary waste space "down cellar" into a gay playroom the whole family can enjoy. Quickly. Easily. Reasonably.

One of the most important questions you'll have to answer is, "What to do about floors and walls?"

You are sure to please when you specify Flexachrome for floors, and Mura-Tex for walls. Why?

Because they're decorator-designed in a wide range of sharp, clear colors . . . *Companion colors* that harmonize or contrast perfectly. You can design special inserts to set into the tile, like the shuffleboard above . . . a personal monogram . . . or anything that meets a whim, yours or your clients'. We'll cut them to your order.

And your clients will sing your praises long after your job is done.

These plastic-asbestos tiles are so tough and durable the most active family imaginable isn't likely ever to wear them out. Yet they stay clean and sparkling with a minimum of maintenance . . . a real boon for today's "help-less" housewives.

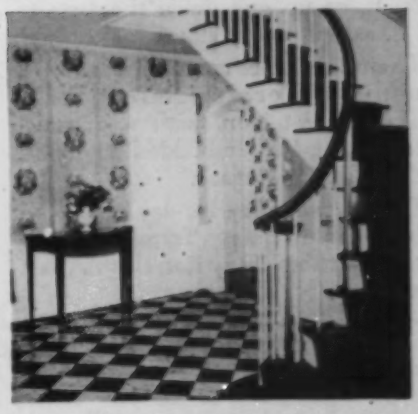
Get full particulars on these and other Tile-Tex products. See Sweet's, or write us. We'll rush complete data and specifications. THE TILE-TEX DIVISION, The Flintkote Company, Chicago Heights, Illinois.

Tile-Tex

PLASTIC-ASBESTOS

FLOORS AND WALLS

*Flexachrome makes a dramatic entrance**



A good first impression is a foregone conclusion when you specify Flexachrome for the foyer. Big black and white tiles in a sharp, clear checkerboard pattern make a striking entrance, as durable as it is beautiful . . . as easy to clean as it is easy to look at.

**Registered Trademark, The Flintkote Company*

(*Continued from page 182*)

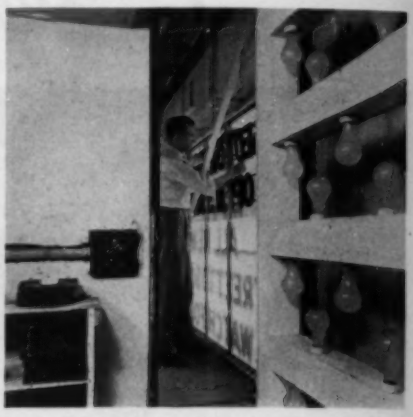
in Milwaukee, the new sign is designed as a room, which makes it possible to save time and expense by servicing the attraction board from inside.

With this sign, the manufacturer reports, the exhibitor can change copy from the inside without ladders; provide a convenient, efficient letter storage space; remove plastic from letter frames easily when necessary; clean plastic quickly and safely; use color changer to vary attraction board colors; change and clean lamps without disturbing feature copy; project pictures or slides on the attraction boards.

An important advantage pointed out by the designers is the additional brilliance achieved by the more frequent cleaning of the sign made possible by ease of access to it.

The inner-service marquee utilizes industrial-type Holophane reflectors to give even distribution of light over the entire sign face.

For reasons of space economy, the Strand sign substitutes a conventional-type lighting structure which rides on an overhead trolley to facilitate removal of the entire lighting structure for letter changing and cleaning. This substitution is the only basic difference between the two signs.



View of interior and lighting structure

The inner-service design has been patented. Poblocki & Sons Co., 2159 Kinnickinnic Ave., Milwaukee 7, Wis.

IDENTIFICATION BY COLOR

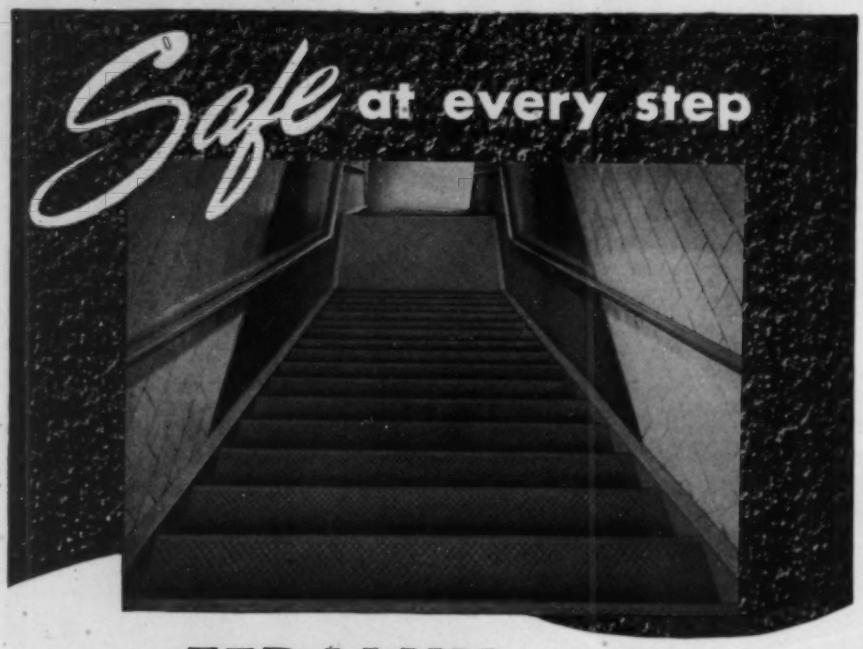
Architect's inspection of metal lath work is simplified by the use of *Color-Rite* metal lath, because weight and direction of application are evident from the colored band at the end of each sheet of lath. Easier application is also reported. United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

Colored ends make lath inspection easier

AUTOMATIC WASHERS

Designed for use in self-service laundries, apartment house or multiple-unit dwellings and in other commercial installations are two new automatic washers which complete the entire cycle in 35 minutes.

(*Continued on page 186*)



WITH FERALUN SAFETY TREADS

Workmen at the Curtiss Wright Plant, Propeller Division, Caldwell, N. J., go up and down these stairs . . . safe at every step.

Their shoe soles come to grips with non-slip Feralun Safety Stair Treads, cast iron, with wear-resistant abrasive embedded right in the walking surface.

Heavy traffic day in, day out — — but Feralun Safety Treads, built to take hard use, stay non-slip . . . last and last.

And that means low maintenance . . . and high safety.

4 TYPES:

Cast iron base . . . . . FERALUN
Bronze base . . . . BRONZALUN
Aluminum base . . . ALUMALUN
Nickel bronze base . . NICALUN

3 SURFACE STYLES:

hatched . . . plain . . . fluted

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☐ Please have one of your safety engineers contact me.

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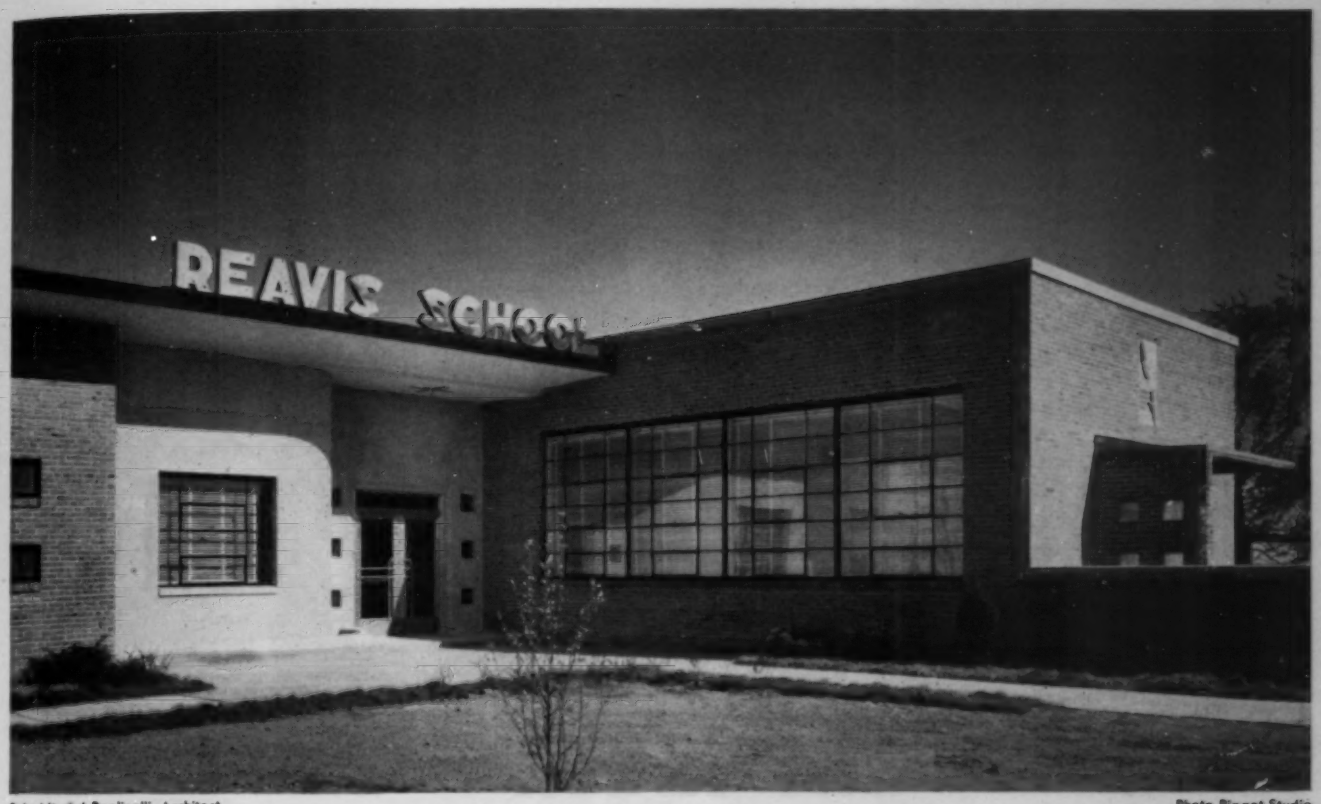

Schmidt and Paolinelli, Architect

Photo Piaget Studio

WHAT ARE WINDOWS' MOST IMPORTANT FUNCTION IN SCHOOLS?

1. To admit natural daylight...2. To control ventilation...3. To provide distant vision...4. To protect against the elements.

WHAT WINDOWS DO ALL FOUR BEST?

Ceco* Steel Windows...Here's how:

1. Less obstruction due to slender frames and muntins means up to 60% more light area. Then, too, they employ clear glass which lets in the greatest amount of light.

2. Ventilation is controlled up to 100%—drafts are avoided.

3. Bulky and intruding interruptions to view are minimized because of slender frames and muntins. The result—more distant vision.

4. Tight weatherseal means heat and cold from the outside are always under control.

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WRITE FOR DESCRIPTIVE BOOKLET

In construction products **CECO ENGINEERING** *makes the big difference*

(*Continued from page 184*)

These models represent revision of a standard line for commercial installation. One, the AW6C1, has a built-in coin meter and coin box; the other, the AW6C2, has no coin meter attachment.

The washers hold up to nine pounds of assorted dry clothes and automatically wash, rinse, damp-dry, and shut themselves off. Water temperature may be set for warm or hot.

The units are 36 in. high, 27 in. wide and 27 in. deep, made of rust-resistant steel and finished in white baked enamel. General Electric, Appliance & Merchandise Dept., Bridgeport 2, Conn.

LADDER BRACKET

Described as useful for home owner or contractor, the *Steadfast* offset ladder bracket is designed to prevent damage to cornices and gutters.

Ladders are supported by a swivel-bearing plate from roof slopes, regardless of pitch, and ladder rails are thus kept free of cornice members.

Offsetting the ladder from the sidewall permits mechanics to work under projecting areas and to install storm or screen windows, hang gutters, paint cornices and repair gutters, the manufacturer points out. Steadfast Equipment Co., 57 Wheeler Ave., Pleasantville, N. Y.

CONTROL FOR GAS BURNERS

Magic-Heet control, now furnished with *Smithway* gas conversion burners and hot water boilers, is described as the long-sought answer to the problem of eliminating the "cold 70" condition so prevalent in conventional automatic firing.

Simplicity of design and operation of the throttling control are reported to keep cost of installation and service requirements low. A. O. Smith Corp., Toledo, Ohio.

WALL SWITCH PLATES

Electrical wall switch plates double-sized to protect walls from soiling and perforated for easy installation on single tumbler light switches are being offered in a new line.

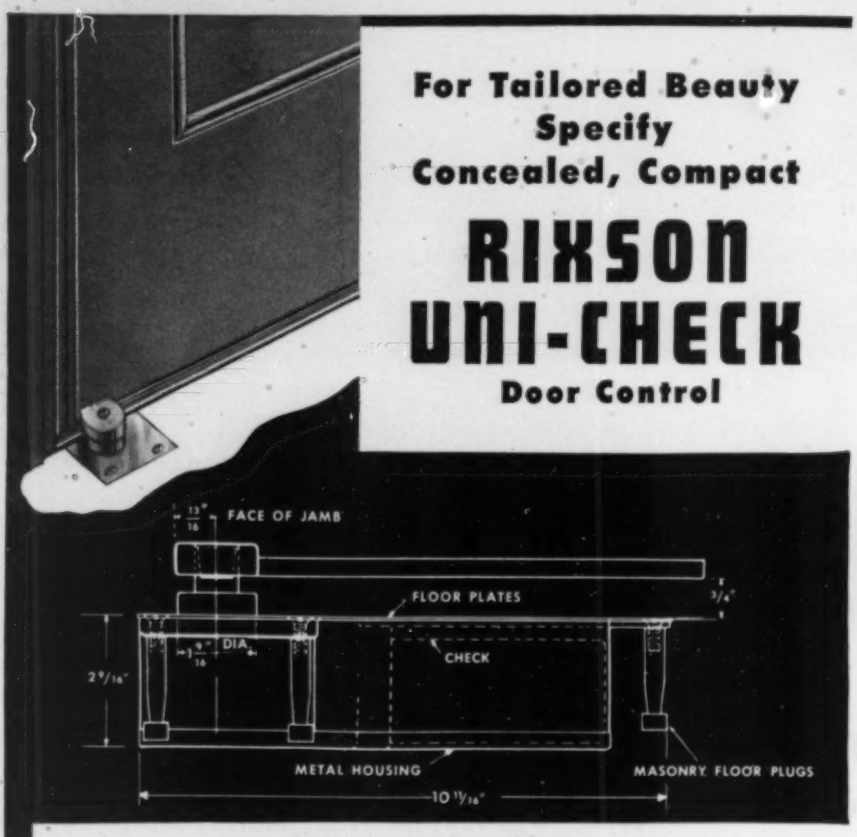
Finished in Alumilite processed basic shades to harmonize with any color scheme, the plates are 26 in. square. The extra size is said to eliminate the need for shields or mats on the walls.

The *Sianor* plates are also available in scratch-proof, deep-dimpled patterns in special rigidized stainless steel. The Sianor Co., 3746 Kelley Ave., Cleveland 14, Ohio.

CABLE CONNECTOR

A new connector for fastening non-metallic sheathed cable to electrical outlet boxes is made of spring steel for ease of installation and is plated against corrosion. It is installed by being pressed firmly with the thumb or tapped lightly from the inside of the knock-out until the connector snaps into position against the outlet box. The non-metallic cable is then pushed through the connector to the desired length where it is held in position without screws or locknuts. Should removal of the connector be necessary, it is pressed together with pliers and pushed through the knock-out. The *Paige No. 52 Connectors* are reported suitable for composition, plastic and rubber insulated cable. Allied Electrical Mfg. Corp., 1 N. LaSalle St., Chicago 2, Ill.

(*Continued on page 188*)



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RIXSON UNI-CHECK

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For Any Interior Door—at a Cost Comparable to Ordinary Treatment

Wherever self-closing doors are convenient or necessary, the Rixson Uni-Check is chosen by many hundreds of architects and builders for its clean-cut, functional design and quiet, automatic operation.

In four spring capacities, the Uni-Check is suited to any interior door, wood or metal—permanent partitions as well as main doors.

Note the compact width and depth of this sturdy unit. Only six movable parts. The door is mounted directly on the Uni-Check. The top pivot is offered in cast bronze or malleable iron or with ball bearing. Automatic hold-open device available.

For a concealed interior door control *anywhere,* consider the Uni-Check.

Special problems of installation will receive prompt attention from the Rixson engineering and designing departments.

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Address.....

City.....*Zone*....*State*.....

Attention:.....

(*Continued from page 186*)

PROTECTION FOR BLUEPRINTS

Chartex provides a cloth backing for maps, charts, blueprints and other documents with no equipment but a flatiron.

The sheet of Chartex is placed on the back of the document to be protected and a heated flatiron (temperature low or moderate) is passed over the sheet.

The resulting permanent cloth backing, according to the manufacturer, keeps the document soft and pliable, reinforced against tearing, for an indefinite time. Seal Inc., Shelton, Conn.

CORNER LAVATORY

A new design in corner lavatories, the *Vivian*, is described as the ideal solution for use in rooms where space is at a premium, since it takes full advantage of space that might otherwise be wasted, yet gives the user complete freedom of arm movement.

The new lavatory, of vitreous china, has a spout of the same material on a bevel panel at the back. Chromium-plated handles on either side of the spout operate the controls, which utilize the water's own pressure to help shut off water flow.

The lavatory, which is equipped with a positive-action waste fitting, measures 18 by 18 in. overall, and the basin is 16 by 11 in., with a depth of 6 in. at the outlet. Crane Co., 836 S. Michigan Ave., Chicago, Ill.

AIR CONDITIONER, PURIFIER

Designed to clean, freshen, control the humidity and purify the air passing through it, is a new air treating unit for the home.

The *TEG Conditioner* vaporizes an infinitesimally small amount of triethylene glycol into its air stream which produces a killing action on certain types of airborne bacteria.

The blower of the conditioner draws air through a glass fiber filter-cell flushed continuously by Tegelene. Air is cleaned of dirt particles by intimate contact with the Tegelene and wetted glass fibers. The residue dirt which tends to build up is continuously washed off the cell by the flushing action of the purifying liquid.

Air passing over the saturated filter-cell is humidified by water in the Tegelene; the air also picks up a small amount of glycol vapor which kills the airborne bacteria.

Although it has been used primarily in conjunction with warm air heating, the new conditioner may also be installed to work in connection with a steam or hot water system.

The conditioner is 56¼ in. high, 26 in. wide and 35 in. deep. It is enclosed in a French gray baked enamel jacket having a crinkle finish. The unit has a ¼ hp blower motor and a 1/30 hp pump motor. The shipping weight is 400 lb. National Air Conditioning, Inc., Johnstown, Pa.

ERRATUM

In the caption for a diagram of the *Hubbell SP-49 Receptacle*, published in the June issue, the word "rubber" was inadvertently used in a phrase describing the rollers, which are of fibre. The receptacle, a safety-type electrical wall fixture, is made by Harvey Hubbell, Inc., Bridgeport, Conn.

★ NEARLY ALL BUILDING MATERIALS "Sponge-up" HEAT RAYS

"As a matter of fact, practically all materials used in building construction—brick, stone, wood, paper and so on—regardless of the color to visible light, are over 90% black for infra-red radiation. Therefore, air spaces within building walls are bounded by materials which are *good absorbers of the radiation* which impinges on them." DR. J. L. FINCK, in the January 1935 "Architectural Record."

AND, F.H.A. Tech Circular No. 7 says on Page 18: "The *ordinary* surface has an *emissivity of 90 per cent.*"

(The italics are ours in both quotations.)

★ INFRA INSULATION *Blocks* HEAT RAYS

★ BARS MOISTURE AND VAPOR ★ MINIMIZES CONDUCTION

★ CHECKS CONVECTION CURRENTS

The aluminum surfaces of Infra *transmit* or *emit* by radiation only a *negligible percentage* of heat actually absorbed by conduction, convection, and radiation; only 3% against 90%, or 1/30th the radiant heat absorption, and 1/30th the emissivity, or ability to transmit heat rays, of ordinary insulation. The slight mass—1 to 500 of low-conductive air—practically eliminates conduction. Scientific compartmentation and construction prevent the flow of convection currents.

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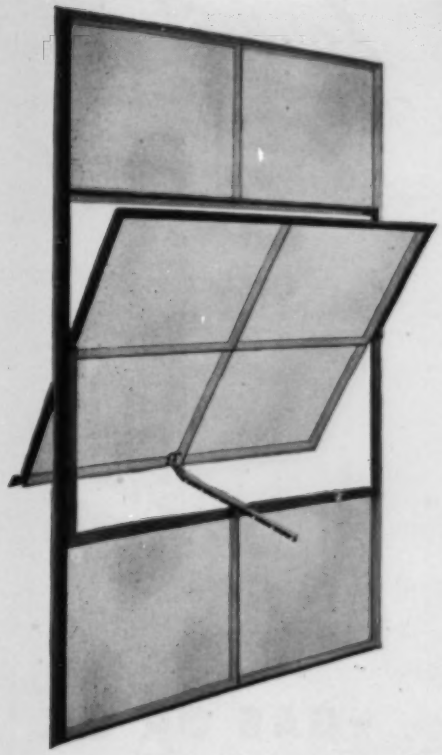
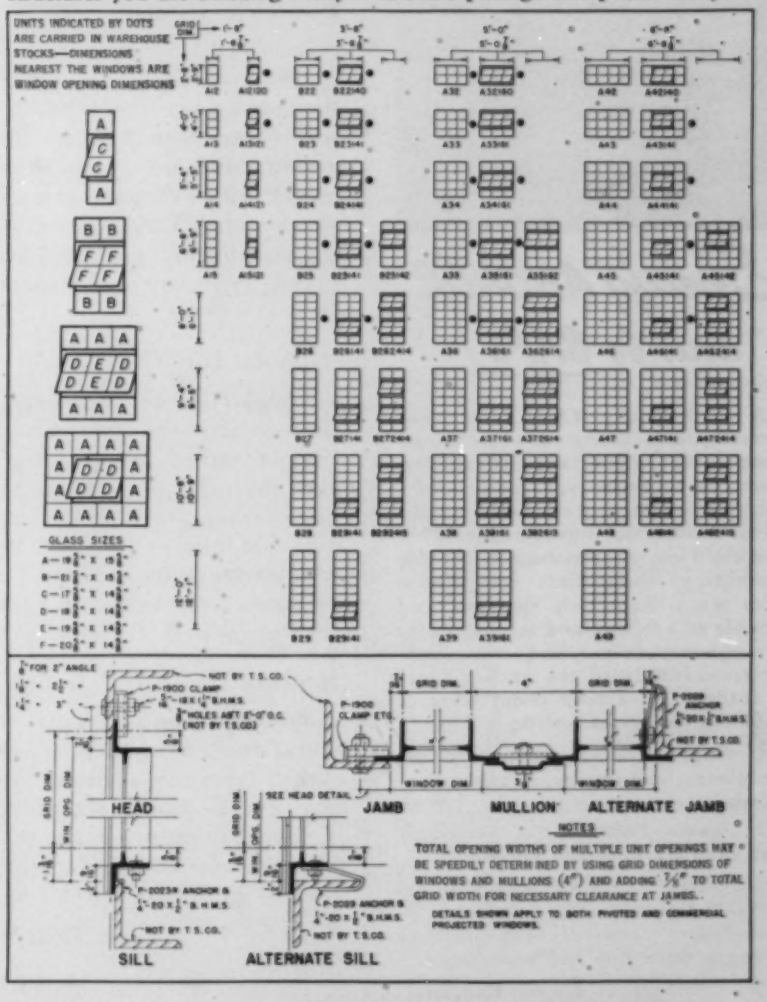
SALESMAKER of The Month



TRUSCON PIVOTED STEEL WINDOWS

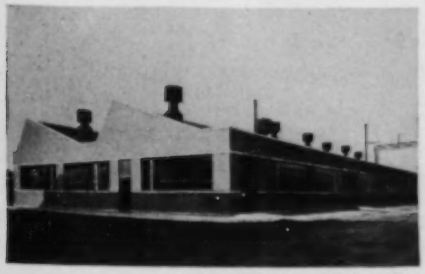
are adaptable to all types of industrial and commercial buildings

Warehouses, factory and storage buildings, garages, filling stations, and a wide range of other non-residential buildings can utilize the lighting, ventilating and economy features of these Truscon Windows. Use them in the structures you are building—they will build prestige and profits for you.


UNITS INDICATED BY DOTS ARE CARRIED IN WAREHOUSE STOCKS—DIMENSIONS NEAREST THE WINDOWS ARE WINDOW OPENING DIMENSIONS
GLASS SIZES
HEAD
JAMB
MULLION
ALTERNATE JAMB
SILL
ALTERNATE SILL
NOTES
TOTAL OPENING WIDTHS OF MULTIPLE UNIT OPENINGS MAY BE SPEEDILY DETERMINED BY USING GRID DIMENSIONS OF WINDOWS AND MULLIONS (4") AND ADDING 3/16" TO TOTAL GRID WIDTH FOR NECESSARY CLEARANCE AT JAMBS.
DETAILS SHOWN APPLY TO BOTH PIVOTED AND COMMERCIAL PROJECTED WINDOWS.

Wide Range of Types and Sizes

Truscon Pivoted Steel Windows are made of heavy, hot-rolled steel sections. The outside section is of angle shape, providing a ⅝" anchorage at the masonry or mullion connection. The intersection of the horizontal and vertical members is a dovetail mitre rigidly interlocking the bars. All muntin bars, except where ventilators occur, are continuous from head to sill and jamb to jamb. Double contact weathering is provided on all four sides of ventilator.



A typical Truscon Pivoted Steel Window installation showing the extensive lighting and ventilating possibilities of this unit.

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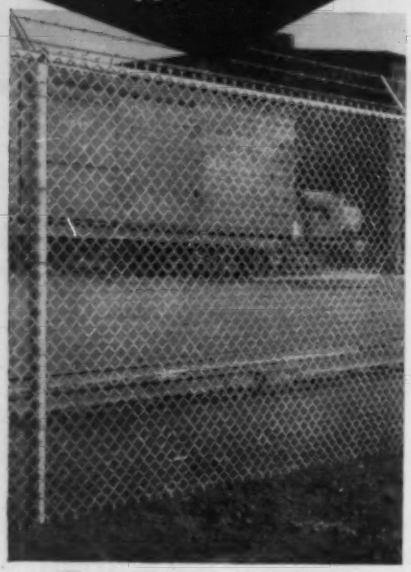
TO FENCE BEFORE
YOU BUILD



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(*Continued from page 148*)

nets and counter tops. Outlines special construction features. 4 pp., illus. Midwest Mfg. Co., Galesburg, Ill.*

Radiant Heating Controls

Electronic Moduflow for Radiant Panel Heating. Discusses problems in controlling radiant panel heating. Describes typical applications of Electronic Moduflow for controlling forced hot water and hot air systems heating both floor and ceiling panels. 8 pp., illus. Minneapolis-Honeywell Regulator Co., Sales Promotion Dept., Minneapolis 8, Minn.

Electrical Distribution

National Electric Plug-In-Strip. Covers two types of Plug-In Strip — constant service, two wire strip with outlets spaced every 6 or 18 in. and the three wire strip with outlets every 18 in. which provides either constant service or wall switch control. Various fittings required are included. 12 pp., illus. National Electric Products Corp., Pittsburgh 30, Pa.*

Asphalt Tile

Asphalt Tile Color Classification Chart. Guide to show the commercial equivalents of various manufacturers' color lines which give the same general color tone or effect. The 15 most widely used colors are listed on the chart. Included are instructions for the care of asphalt tile floors. 2 pp. Asphalt Tile Institute, 101 Park Ave., New York 17, N. Y.

Heating

Baseboard Heating. Popular explanation of baseboard heating covering the various types now available. Describes how it works, lists advantages and tells of current research work. 16 pp., illus. Plumbing and Heating Industries Bureau, 35 E. Wacker Drive, Chicago 1, Ill. *10 cents.*

Marble

Care and Cleaning of Marble. Covers the cleaning of interior and exterior building marble, cleaning by the poultice method, stain removal, marble cleaning precautions, materials suggested for use in the care and cleaning processes. 16 pp., illus. Marble Institute of America, Inc., Romer Shawhan, Managing Director, 108 Forster Ave., Mount Vernon, N. Y.*

(*Continued on page 192*)

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